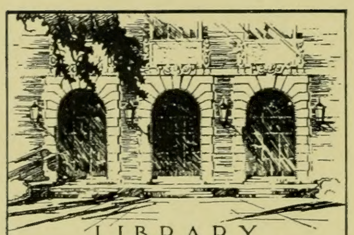

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PHYCOLOGIA BRITANNICA:

OR

HISTORY OF BRITISH SEA-WEEDS,

CONTAINING

COLOURED FIGURES, GENERIC AND SPECIFIC CHARACTERS,
SYNONYMES, AND DESCRIPTIONS

OF

ALL THE SPECIES OF ALGÆ INHABITING THE SHORES OF THE

BRITISH ISLANDS.

MASON'S SCIENCE COLLEGE LIBRARY
BIRMINGHAM

BY

WILLIAM HENRY HARVEY, M.D., M.R.I.A.,

Keeper of the Herbarium of the University of Dublin, and
Professor of Botany to the Royal Dublin Society.

IN THREE VOLUMES.
VOL. III.

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PREFACE.

In issuing the first part of this work, on the 1st of January, 1846, it was proposed that it should comprise figures and descriptions of all known British Marine Algæ. The number of species enumerated in the Synopsis is 388, of which 378 are figured on the 360 plates contained in these volumes. The remaining ten unfigured species are either altogether obscure and uncertain, or else are of such rarity, that I have been unable to obtain specimens of them. Of the genera *Ectocarpus, Polysiphonia, Ceramium, Callithamnion, Cladophora,* and *Enteromorpha,* of which several are now introduced for the first time to the British list, some few distinct-looking forms, preserved in my own and other herbaria, remain unfigured for further examination, and possibly some that may eventually rank as species. I am aware that already several of them have received names in the 'Species Algarum' of Kützing, but I have hesitated adopting them, from a well-grounded fear, that in doing so without a very careful examination of specimens of all ages, I should only open the door to a flood of spurious species, and convert the study of these plants into a mere effort to arrange and describe solitary or deformed specimens. Every student of marine botany must know that the Algæ, more than most other plants, *sport* (as the gardeners phrase it) into endless varieties, sometimes on account of circumstances in their habitat, and sometimes from reasons unknown to us. *Halymenia ligulata, Gelidium corneum,* and many others which might be named, put on so many forms, that a botanist, unfamiliar with them or judging merely from dried specimens, could scarcely avoid making every form a distinct species. And why should we deny an equal latitude to our old friend *Ceramium rubrum,* which some modern botanists would divide into almost as many species as there are individuals? I have never been quite satisfied of the propriety of separating *C. botryocarpum,* the only new species of this group on which I have ventured; but had I followed the wishes of some of my correspondents, I should have split *C. rubrum* into at least a dozen. I felt, however, that in doing so, I should be preparing so many puzzles for those that may come after me, and that instead of the author of a future Phycologia having to tell that his predecessor had left him but ten species which he had been unable to ascertain, my successor would have at least a hundred to lay at my door. To avoid such a consummation, I have abstained from much species-splitting which has been suggested to me, and perhaps have sometimes erred, but, as I think, on the safer side, by over-caution. In a few cases, in the genera *Ectocarpus, Cladophora,* and *Enteromorpha,* where I have used some latitude, I have possibly gone in some cases too far. For these sins I entreat a charitable criticism on the same grounds of excuse offered by a lively Quaker when reproved, by a graver brother, for his witticisms: "Friend, if thou knew how much I keep in, thou wouldst not find fault with what I let out." And if you, dear Critic, could know the number of puzzling forms of Algæ which in the course of the last five years have passed through my hands, and which I have had to reduce to their specific types, you would judge leniently of my mistakes, where I may have been deceived by such forms, and wrongly proposed them as new species.

Whatever may be my errors in this respect, I have the satisfaction to know that the study of British Marine Botany has been fostered and extended by this work; and this, to an author who feels a personal interest in his subject, is the best reward for his labours. A progressive taste has shown itself for these plants, in the large increase of collectors within the past five years, and in the number of my correspondents since the monthly issue commenced. Many new species have been discovered, and several others added to the British list; and several, which had not been gathered for many years previously, have been rediscovered, some in new habitats, and some in their old, but lost, stations. Very few of these discoveries or additions have been made by myself, but are due to the zeal of my correspondents, a majority of whom, familiar as I am with their handwriting and friendly feeling, are personally unknown to me.

To those kind correspondents I would now return my most grateful thanks. Their number is too great to particularize every name, and I dare not trust myself with naming many, lest I might accidentally omit some valued friend;—but there are a few to whom I cannot omit a further expression of gratitude for their unwearied assistance, and the essential service they have rendered to me. And first I would express my deep obligation to my invaluable friend Mrs. Griffiths, to whose contributions almost every page of these volumes bears witness, and without whose assistance many rare species could not have been properly illustrated. To my kind Plymouth friends, the Rev. Mr. Hore, Dr. Cocks, Mr. Rohloff, and Mr. Boswarva, I am indebted for many hundreds of beautifully preserved specimens. To Miss White and Miss Turner I owe almost all my acquaintance with the Algæ of the Channel Islands, and the latter lady has added more than one new species to our list. To Rev. Mr. Pollexfen and Dr. M'Bain I am indebted for Orkney Algæ; and to Miss Warren, Miss Ball, Miss Gifford, Miss Cutler, Mrs. Gatty, Mrs. Gulson, Mrs. Hayden, Rev. Dr. Landsborough, Dr. Dickie, Mr. Ralfs, Rev. Mr. Cresswell, &c., for specimens of the rarer Algæ of their respective neighbourhoods; and to these, and all other kind friends, whether enumerated in this place or in the body of the work, I would now record my obligations of gratitude for their liberal communications and sympathy.

W. H. H.

Trinity College, Dublin.
July 30, 1851.

SYNOPSIS

OF THE

ORDERS AND GENERA.

Sub-class I. MELANOSPERMEÆ OR FUCALES.

(Olive Seaweeds.)

Order 1. Fucaceæ. *Olive-coloured, inarticulate seaweeds, whose* spores *are contained in spherical cavities of the frond.*

* *Air-vessels stalked.*

I. Sargassum. *Branches* bearing ribbed leaves. *Air-vessels* simple.

II. Halidrys. *Frond* linear, pinnate, leafless. *Air-vessels* plurilocular.

* * *Air-vessels immersed in the frond, or none.*

III. Cystoseira. *Root* scutate. *Frond* much branched, bushy. *Receptacles* cellular.

IV. Pycnophycus. *Root* branching. *Frond* cylindrical. *Receptacles* cellular.

V. Fucus. *Root* scutate. *Frond* dichotomous. *Receptacles* small, filled with mucus, traversed by a net-work of jointed threads.

VI. Himanthalia. *Root* scutate. *Frond* cup-shaped. *Receptacles* very long, strap-shaped, dichotomously branched.

Order 2. Sporochnaceæ. *Olive-coloured, inarticulate seaweeds, whose* spores *are attached to external, jointed filaments, which are either free, or compacted together into knob-like masses.*

* *Spores attached to pencilled filaments.*

VII. Desmarestia. *Frond* solid, distichous, filiform, or flat.

VIII. Arthrocladia. *Frond* filiform, nodose, traversed by a jointed tube.

* * *Spores in knob-like receptacles.*

IX. Sporochnus. *Receptacles* lateral, stalked.

X. Carpomitra. *Receptacles* terminal.

Order 3. Laminariaceæ. *Olive-coloured, inarticulate seaweeds, whose* spores *are superficial, either forming cloud-like patches, or covering the whole surface of the frond.*

XI. Alária. Stipitate. *Stipes* ending in a midribbed leaf.

XII. Laminaria. Stipitate. *Stipes* ending in a ribless leaf.

XIII. Chorda. *Frond* leafless, cylindrical, hollow; the cavity interrupted by transverse partitions.

Order 4. DICTYOTACEÆ. *Olive-coloured, inarticulate seaweeds, whose* spores *are superficial, disposed in definite spots or lines (sori).*

* *Root coated with woolly fibres, frond flat.*

XIV. CUTLERIA. *Frond* ribless, irregularly cleft. *Sori* dot-like, scattered. *Spores* pedicellate, containing numerous sporules.

XV. HALISERIS. *Frond* midribbed.

XVI. PADINA. *Frond* ,ribless, fan-shaped, concentrically striate. *Sori* linear, concentric, bursting through the epidermis.

XVII. ZONARIA. *Frond* ribless, lobed, concentrically striate. *Sori* roundish, containing spores and jointed threads.

XVIII. TAONIA. *Frond* ribless, irregularly cleft, somewhat fan-shaped. *Sori* linear, concentric, superficial, alternating with scattered spores.

XIX. DICTYOTA. *Frond* ribless, linear, dichotomous. *Sori* roundish, scattered, bursting through the epidermis: or, (on distinct plants) scattered spores.

* * *Root a minute naked disc. Frond cylindrical, branched.*

XX. STILOPHORA. *Spores* concealed among moniliform threads, which are collected into convex, wart-like *sori.*

XXI. DICTYOSIPHON. *Spores* irregularly scattered, solitary, or in dot-like *sori,* not accompanied by moniliform threads.

XXII. STRIARIA. *Spores* in dot-like *sori,* ranged in transverse lines.

* * * *Root naked. Frond unbranched, cylindrical, or flat.*

XXIII. PUNCTARIA. *Frond* flat, leaf-like.

XXIV. ASPEROCOCCUS. *Frond* membranaceous, tubular, either cylindrical or compressed. *Spores* in dot-like *sori,* mixed with a few jointed threads.

XXV. LITOSIPHON. *Frond* cartilaginous, filiform, sub-solid. *Spores* scattered, sub-solitary.

Order 5. CHORDARIACEÆ. *Olive-coloured seaweeds, with a gelatinous or cartilaginous frond, composed of vertical and horizontal filaments interlaced together.*

* *Frond cylindrical, branching.*

XXVI. CHORDARIA. *Axis* cartilaginous, dense; filaments of. the circumference unbranched.

XXVII. MESOGLOIA. *Axis* gelatinous, loose; filaments of the circumference branching.

* * *Frond either tuber-shaped, or crustaceous and spreading.*

XXVIII. LEATHESIA. *Frond* tuber-shaped.

XXIX. RALFSIA. *Frond* crustaceous.

* * * *Parasites, consisting of densely tufted filaments, connected at the base, free above.*

XXX. ELACHISTA. *Filaments* pencilled, rising from a tubercular base, composed of vertical fibres.

XXXI. MYRIONEMA. *Tufts* cushion-like; filaments rising from a flat base, composed of decumbent fibres.

Order 6. ECTOCARPACEÆ. *Olive-coloured, articulated, filiform seaweeds, whose* spores *are (generally) external, attached to the jointed ramuli.*

* *Frond rigid; each articulation composed of numerous cells.*

XXXII. CLADOSTEPHUS. *Ramuli* whorled.

XXXIII. SPHACELARIA. *Ramuli* distichous, mostly pinnated.

** * Frond flaccid; each articulation formed of a single cell.*

XXXIV. ECTOCARPUS. *Frond* branching; ramuli scattered.

XXXV. MYRIOTRICHIA. *Frond* unbranched; ramuli whorled, and tipped with pellucid fibres.

SUB-CLASS II. RHODOSPERMEÆ OR CERAMIALES.

(Red* or Brown-red Seaweeds.)

Order 7. RHODOMELACEÆ. *Red or brown-red seaweeds, with a leafy or filiform, areolated or articulated frond, composed of polygonal cells.* Fruit *double*: Conceptacles (ceramidia) *external, ovate or urn-shaped, with a terminal pore, and containing a tuft of pear-shaped* spores: 2. Tetraspores *immersed in distorted ramuli, or contained in proper* receptacles (*called here* stichidia).

** Frond flattened, pinnatifid.*

XXXVI. ODONTHALIA.

** * Frond filiform, wholly inarticulate.*

XXXVII. RHODOMELA. *Branches* coated with minute, irregular cells. *Apices* not involute.

XXXVIII. BOSTRYCHIA. *Branches* dotted; the surface cells quadrate. *Apices* strongly involute.

XXXIX. RYTIPHLÆA. *Branches* transversely striate, at short distances.

** * * Frond filiform, partially or generally articulate.*

XL. POLYSIPHONIA. *Articulations* of the ramuli two- or many-tubed. *Tetraspores* in distorted ramuli.

XLI. DASYA. *Articulations* of the ramuli single-tubed. *Tetraspores* in lanceolate pod-like receptacles (*Stichidia*).

Order 8. LAURENCIACEÆ. *Rose-red or purple seaweeds, with a cylindrical or compressed, rarely flat, linear, narrow, areolated, inarticulate, or constricted and chambered, branching frond, composed of polygonal cells.* Fruit *double*: 1. Conceptacles (ceramidia) *external, ovate, with a terminal pore, and containing a tuft of pear-shaped* spores: 2. Tetraspores *scattered without order among the surface cells of the branches and ramuli.*

** Frond solid.*

XLII. BONNEMAISONIA. Rose-red, excessively branched, distichous; ramuli subulate, acute.

XLIII. LAURENCIA. Purplish, yellowish, or reddish, pinnatifid or pinnate; ramuli obtuse.

** * Frond (at least the branches) hollow.*

XLIV. CHRYSYMENIA. *Frond* neither constricted nor chambered.

XLV. CHYLOCLADIA. *Frond* (at least the branches) constricted at intervals and chambered.

Order 9. CORALLINACEÆ. *Rigid, articulated, or crustaceous, mostly calcareous seaweeds, purple when recent, fading on exposure to milk-white, composed of cells in which carbonate of lime is deposited in an organized form.* Tetraspores *tufted, contained in ovate or spherical* conceptacles (ceramidia) *furnished with a terminal pore.*

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* See also *Ulvaceæ* and *Oscillatoriaceæ* among the Green Algæ.

* *Frond filiform, articulated.*

XLVI. Corallina. *Frond* pinnated. *Ceramidia* terminal, simple.

XLVII. Jania. *Frond* (in the Brit. species) dichotomous. *Ceramidia* tipped with two horn-like ramuli.

* * *Frond crustaceous or foliaceous, not articulated.*

XLVIII. Melobesia. Opake, stony; crustaceous, foliaceous, or shrubby.

XLIX.? Hildenbrandtia. Cartilaginous (not stony), incrusting rocks.

L.? Hapalidium (*Kütz.*). Minute, crustaceo-membranaceous, hyaline, composed of a single stratum of cells radiating from a centre.

Order 10. Delesseriaceæ. *Rosy or purple-red or blood-red seaweeds, with a leafy, rarely filiform, areolated, inarticulate frond, composed of polygonal cells.* Leaves *delicately membranaceous.* Fructification *double*: 1. Conceptacles (coccidia) *external or half-immersed, hemispherical, usually imperforate, containing, beneath a membranous pericarp, a tuft of filaments, whose cells are finally changed into* spores. 2. Tetraspores *in distinctly defined* sori, *either scattered or confined to proper leaflets* (sporophylla).

LI. Delesseria. *Frond* leafy, of definite form, with a percurrent midrib.

LII. Nitophyllum. *Frond* leafy, irregularly lobed, without midrib.

LIII. Plocamium. *Frond* linear, compressed, distichously much branched; ramuli pectinate, acute.

Order 11. Rhodymeniaceæ. *Purplish or blood-red seaweeds, with an expanded or filiform, inarticulate frond, composed of polygonal cells; occasionally traversed by a fibroso-cellular axis.* Superficial cells *minute, irregularly packed, or (rarely) disposed in excentric filaments.* Fructification *double*: 1. Conceptacles (coccidia) *external or half-immersed, globose or hemispherical, imperforate, containing, beneath a thick pericarp, a mass of* spores, *on a central* placenta. 2. Tetraspores *either dispersed indefinitely, or forming cloud-like patches.*

* *Frond flat, leaf-like, dichotomous, or palmate.*

LIV.? Stenogramme. *Conceptacles* linear, rib-like. (*Sori* definite.)

LV. Rhodymenia. *Conceptacles* hemispherical, scattered.

* * *Frond compressed or terete, shrubby, much branched.*

LVI. Sphærococcus. *Frond* linear, two-edged, distichous, traversed by an obscure midrib.

LVII. Gracilaria. *Frond* filiform (rarely compressed or flat), irregularly branched; the central cells very large.

LVIII. Hypnea. *Frond* filiform, irregularly branched, traversed by a fibro-cellular axis.

Order 12. Cryptonemiaceæ. *Purplish or rose-red seaweeds, with a filiform or (rarely) expanded, gelatinous or cartilaginous frond, composed, wholly or in part, of cylindrical cells, connected together into threads or filaments.* Axis *formed of vertical,* periphery *of horizontally excentric filaments.* Fructification *double*: 1. Conceptacles (favellidia), *globose masses of* spores *immersed in the frond, or in swellings of the branches.* 2. Tetraspores *variously dispersed.*

Sub-order 1. Coccocarpeæ. Frond *solid, dense, cartilaginous, or horny.* Favellidia *in semi-external* tubercles *or swellings of the frond.*

LIX. Grateloupia. Pinnated, flat, membranaceo-cartilaginous, of very dense structure. *Favellidia* with a pore. *Tetraspores* scattered.

LX. Gelidium. Pinnated, compressed, horny, of very dense structure. *Favellidia* in swollen ramuli, imperforate. *Tetraspores* in sori.

LXI. Gigartina. *Frond* variously branched, cartilaginous; its flesh composed of anastomosing filaments, lying apart in firm gelatine. *Favellidia* in external *tubercles*. *Tetraspores* contained in dense, immersed *sori*.

Sub-order 2. Spongiocarpeæ. Frond *solid, dense, cartilaginous, or horny*. Favellidia *(of several) imperfectly known*. Wart-like swellings (*or* nemahtecia) *composed of filaments, sometimes changed into* tetraspores; *sometimes into* spores.

LXII. Chondrus. *Frond* flabelliform, dichotomously cleft, cartilaginous; of very dense structure. *Tetraspores* in definite, immersed *sori*.

LXIII. Phyllophora. *Frond* stipitate, rigid-membranaceous, proliferous; of very dense structure. *Tetraspores* in superficial sori, or in proper leaflets.

LXIV. Peyssonelia. *Frond* depressed, expanded, rooting by the under surface, concentrically zoned. *Tetraspores* contained in superficial warts.

LXV. Gymnogongrus. *Frond* filiform, dichotomous, horny, of very dense structure. *Tetraspores* in superficial warts.

LXVI. Polyides. *Root* scutate. *Frond* cylindrical, dichotomous, cartilaginous. *Favellæ* contained in external, spongy warts. *Tetraspores* cruciate, immersed in the branches.

LXVII. Furcellaria. *Root* branching. *Frond* cylindrical, dichotomous, cartilaginous. *Favellæ* immersed in the pod-like swollen extremities of the branches. *Tetraspores* similarly immersed, transversely zoned. (*For correct analysis, see* Tab. CCCLVII. *A.*)

Sub-order 3. Gastrocarpeæ. Frond *gelatinoso-membranaceous, or fleshy, hollow, or of lax texture within*. Favellidia *immersed in the central substance of the frond, very numerous*.

LXVIII. Dumontia. *Frond* cylindrical, tubular. *Favellidia* immersed in the wall of the frond. *Tetraspores* also immersed, cruciate. (*For corrected analysis, see* Tab. CCCLVII. *B.*)

LXIX. Halymenia. *Frond* compressed or flat, gelatinoso-membranaceous, the membranous surfaces connected by a few slender, anastomosing filaments. *Favellidia* attached to the inner face of the wall.

LXX. Ginannia. *Frond* cylindrical, distended, traversed by a fibrous axis; the walls membranaceous, connected with the axis by horizontal filaments. *Favellidia* attached to the walls.

LXXI. Kallymenia. *Frond* expanded, leaf-like, carnoso-membranous, solid, of dense structure. *Favellidia* pimply, half-immersed in the frond, and scattered over its surface.

LXXII. Iridæa. *Frond* expanded, leaf-like, thick, carnoso-coriaceous, solid, of dense structure. *Favellidia* wholly immersed.

LXXIII. Catenella. *Frond* tubular, branched, constricted at intervals into oblong pseudo-articulations; the tube traversed by a few filaments.

Sub-order 4. Gloiocladieæ. Frond *loosely gelatinous; the filaments of which it is composed lying apart from one another, surrounded by a copious gelatine*. Favellidia *immersed*.

LXXIV. Cruoria. *Frond* crustaceous, skin-like.

LXXV. Naccaria. *Frond* filiform, solid, cellular; the ramuli (only) composed of radiating, free filaments.

LXXVI. Gloiosiphonia. *Frond* tubular; the walls composed of radiating filaments.

LXXVII. Nemaleon. *Frond* filiform, solid, elastic; the *axis* composed of closely packed, vertical filaments; the periphery of moniliform, free, horizontal filaments.

LXXVIII. Dudresnaia. *Frond* filiform, solid, gelatinous; the axis composed of a net-work of anastomosing vertical filaments; the periphery of moniliform, free, horizontal filaments.

LXXIX. Crouania. *Frond* filiform, consisting of a jointed filament (*axis*), whorled at the joints with minute, multifid, moniliform, free, horizontal filaments (or ramelli).

Order 13. Ceramiaceæ. *Rose-red or purple seaweeds, with a filiform frond, consisting of an articulated, branching filament, composed of a single string of cylindrical cells, sometimes coated with a stratum of smaller polygonal cells.* Fructification *double*: 1. Favellæ, *berry-like receptacles, with a membranous coat, containing numerous angular* spores. 2. Tetraspores, *attached to the ramuli, or subimmersed in their substance, scattered.*

LXXX. Ptilota. *Frond* compressed, inarticulate, distichous, pectinato-pinnate. *Favellæ* stalked, involucrate.

LXXXI. Microcladia. *Frond* filiform, inarticulate, dichotomous. *Favellæ* sessile, involucrate.

LXXXII. Ceramium. *Frond* filiform, articulate, dichotomous; the nodes opake. *Favellæ* sessile, mostly involucrate. *Tetraspores* immersed or subimmersed.

LXXXIII. Spyridia. *Frond* filiform, inarticulate; the branches clothed with minute, setiform, articulated ramelli. *Favellæ* stalked, involucrate. *Tetraspores* sessile on the ramelli.

LXXXIV. Griffithsia. *Frond* articulated, dichotomous, or clothed with whorled, dichotomous ramelli. *Favellæ* involucrated, sessile, or stalked. *Tetraspores* sessile, on whorled ramelli.

LXXXV. Wrangelia. *Frond* articulated, pinnate. *Favellæ* terminal, involucrated, containing tufts of pear-shaped spores. *Tetraspores* sessile, scattered.

LXXXVI. Seirospora. *Frond* articulated. *Tetraspores* disposed in terminal, moniliform strings.

LXXXVII. Callithamnion. *Frond* (at least the branches and ramuli) articulate, mostly pinnate. *Favellæ* terminal or lateral, sessile, without involucre (except in *C. Turneri*) *Tetraspores* sessile or pedicellate, scattered.

Sub-class III. CHLOROSPERMEÆ OR CONFERVALES.

(Grass-green* Seaweeds.)

Order 14. Siphonaceæ. *Green, marine, or fresh-water Algæ, composed of continuous, tubular, simple, or branched filaments (elongated cylindrical cells), free, or variously combined in cylindrical or expanded fronds.*

LXXXVIII. Codium. *Filaments* combined into a spongy frond.

LXXXIX. Bryopsis. *Filaments* free, pinnated.

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* A few *Ulvaceæ* and *Oscillatoriaceæ* are purple.

XC. VAUCHERIA. *Filaments* free, dichotomous or irregular.

Order 15. CONFERVACEÆ. *Green, marine, or fresh-water Algæ, composed of articulated filaments, simple or branched, free or invested by gelatine. Cells cylindrical, truncate.*

Sub-order 1. CONFERVEÆ. *Filaments free, destitute of gelatine.*

XCI. CLADOPHORA. *Filaments* tufted, branched.

XCII. RHIZOCLONIUM. *Filaments* decumbent, subsimple, emitting a few root-like branches.

XCIII. CONFERVA. *Filaments* unbranched.

Sub-order 2. CHÆTOPHOREÆ. *Filaments united in submembranaceous or gelatinous fronds; cells often tipped with bristles.* Sporangia *external.*

XCIV. OCHLOCHÆTE. *Frond* disciform. *Filaments* radiating from a central point, prostrate, irregularly branched; each cell produced above into a rigid, inarticulate bristle.

Order 16. ULVACEÆ. *Green, or rarely purple, marine or fresh-water Algæ, composed of small polygonal cells, forming expanded membranes, or membranous tubes; very rarely arranged in filaments.*

XCV. ENTEROMORPHA. *Frond* tubular.

XCVI. ULVA. *Frond* flat, green.

XCVII. PORPHYRA. *Frond* flat, purple.

XCVIII. BANGIA. *Frond* filiform (mostly), purple or pink.

Order 17. OSCILLATORIACEÆ. *Green or blue, rarely purple, marine or (more frequently) fresh-water Algæ, composed of continuous, tubular, simple, or rarely branching filaments, which are either free or invested with gelatine.* Endochrome *annulated, at length separating into lenticular* sporidia.

Sub-order 1. RIVULARIEÆ. *Filaments united together into a solid gelatinous or cartilaginous frond.*

XCIX. RIVULARIA. *Filaments* not sheathed.

C. SCHIZOSIPHON. *Filaments* sheathed; the sheath multifid.

Sub-order 2. OSCILLATORIEÆ. *Filaments tufted or stratified, free.*

CI. SCHIZOTHRIX. *Filaments* rigid, in branching bundles, at length splitting.

CII. CALOTHRIX. *Filaments* short, tufted, fixed at the base only.

CIII. LYNGBYA. *Filaments* elongate, decumbent, flaccid.

CIV. MICROCOLEUS. *Filaments* needle-shaped, several enclosed together in membranous or gelatinous sheaths.

CV. OSCILLATORIA. *Filaments* needle-shaped, straight, or slightly curved, short, heaped together in gelatinous strata, oscillating.

CVI. SPIRULINA. *Filaments* spirally twisted, lying in a mucous stratum, vividly oscillating.

Order 18. NOSTOCHACEÆ. *Green, fresh-water or rarely marine Algæ, composed of moniliform filaments, lying in a gelatinous matrix. Cells globose or oval.*

CVII. MONORMIA. A single filament enclosed in a convoluted gelatinous and branching frond.

CVIII. SPHÆROZYGA. *Filaments* free, separate, naked.

CIX. SPERMOSIRA. *Filaments* free, separate; each enclosed in a very delicate, membranous, filiform tube.

Order 19. PALMELLACEÆ.

Sub-order. HORMOSPOREÆ. Cells *contained in confervoid, simple or branching tubular filaments.*

CX. HORMOSPORA.

SYNOPSIS OF THE SPECIES.

I. MELANOSPERMEÆ.

Order 1. FUCACEÆ.

I. SARGASSUM.

1. **vulgare**; stem filiform, alternately branched; leaves lanceolate, serrated, strongly ribbed, glandular; air-vessels on compressed stalks, spherical, pointless; receptacles axillary, unarmed. (Tab. CCCXLIII.)

2. **bacciferum**; leaves linear-lanceolate, very narrow, without pores; air-vessels spherical, mucronate. (Tab. CIX.)

II. HALIDRYS.

3. **siliquosa**; branches linear; air-vessels compressed, linear-lanceolate, slightly constricted at the septa, mucronate. (Tab. LXVI.)

III. CYSTOSEIRA.

4. **ericoides**; stem short, bearing numerous decompound branches, which are densely clothed with short, spine-like ramuli; air-vessels small, solitary; receptacles armed. (Tab. CCLXV.)

5. **granulata**; branches bulbous at the base; receptacles elongate, without mucro. (Tab. LX.)

6. **barbata**; branches bulbous at the base; receptacles short, mucronate. (Tab. CCCLX.)

7. **fœniculacea**; branches slender, rough with hard points, repeatedly dichotomo-pinnate; air-vessels small, one or two together; receptacles minute, smooth, linear-lanceolate. (Tab. CXXII.)

8. **fibrosa**; branches slender, bi-tri-pinnate; pinnules set with setaceous ramuli; vesicles elliptical, solitary or in pairs; receptacles very long, set with spine-like processes. (Tab. CXXXIII.)

IV. PYCNOPHYCUS.

9. **tuberculatus**. (Tab. LXXXIX.)

V. FUCUS.

10. **vesiculosus**; frond flat, midribbed, dichotomous, entire; air-vessels in pairs or absent; receptacles turgid, terminal. (Tab. CCIV.)

11. **ceranoides**; frond plane, coriaceo-*membranaceous*, entire, midribbed, without vesicles, dichotomous, with lateral narrow, dichotomous, fastigiate, fertile branches. (Tab. CCLXXI.)

12. **serratus**; frond flat, midribbed, serrated, without air-vessels. (Tab. XLVII.)

13. **nodosus**; frond compressed, dichotomo-pinnate; branches strap-shaped, attenuated at the base, remotely toothed and here and there swelling into oblong air-vessels, wider than the frond; receptacles lateral, ovate, stalked. (TAB. CLVIII.)

14. **Mackaii**; cylindrical or compressed, dichotomous; air-vessels elliptical, solitary; receptacles lateral, stalked, pendulous, near the base of the dichotomous branches. (TAB. LII.)

15. **canaliculatus**; frond narrow, channelled, without midrib or air-vessels, dichotomous. (TAB. CCXXIX.)

VI. HIMANTHALIA.

16. **lorea**; frond top-shaped; receptacles repeatedly forked. (TAB. LXXVIII.)

Order 2. SPOROCHNACEÆ.

VII. DESMARESTIA.

17. **ligulata**; flat, obscurely midribbed, repeatedly pinnate; pinnæ and pinnulæ opposite, lanceolate. (TAB. CXV.)

18. **aculeata**; branches compressed, slender, bi-tri-pinnate; pinnæ and pinnulæ alternate, margined with subulate spines. (TAB. XLIX.)

19. **viridis**; frond filiform, repeatedly pinnate; pinnæ and pinnulæ capillary, exactly opposite, patent. (TAB. CCCXII.)

VIII. ARTHROCLADIA.

20. **villosa**. (TAB. LXIV.)

IX. SPOROCHNUS.

21. **pedunculatus**; stem undivided; branches lateral, simple; receptacles elliptical. (TAB. LVI.)

X. CARPOMITRA.

22. **Cabreræ**; irregularly dichotomous, linear, narrow, flat, midribbed; branches here and there constricted. (TAB. XIV.)

Order 3. LAMINARIACEÆ.

XI. ALARIA.

23. **esculenta**; frond lanceolate; midrib narrow, cylindrical; leaflets linear-oblong or wedge-form. (TAB. LXXIX.)

XII. LAMINARIA.

24. **digitata**; stipe cylindrical or compressed, elongate; lamina deeply cleft into many linear segments. (TAB. CCXXIII.)

    24.* Var. *stenophylla*, TAB. CCCXXXVIII.

25. **bulbosa**; stipes flat, with a wavy margin, twisted at the base, rising from a hollow, warted tuber; frond deeply cleft into linear segments. (TAB. CCXLI.)

26. **longicruris**; stipes very long, slender at the base, hollow and inflated in the middle, tapering to the apex; lamina undivided, membranaceous, oblong. (TAB. CCCXXXIX.)

27. **saccharina**; stem filiform, solid, expanding into a cartilagineo-coriaceous, lanceolate frond. (TAB. CCLXXXIX.)

28. **Phyllitis**; stipe short, subcompressed, gradually expanding into a linear-lanceolate, delicately membranous, undivided frond. (TAB. CXCII.)

29. **Fascia**; stipe very short, setaceous, ending in a membranaceous, wedge-shaped or lanceolate frond. (TAB. XLV.)

XIII. CHORDA.

30. **filum**; frond filiform, very long, not constricted at the joints. (TAB. CVII.)

31. **lomentaria**; frond membranous, constricted at distant intervals, the interstices inflated. (TAB. CCLXXXV.)

Order 4. DICTYOTACEÆ.

XIV. CUTLERIA.

32. **multifida**; polymorphous, flabelliform, irregularly cleft; laciniæ acute, attenuate. (TAB. LXXV.)

XV. HALISERIS.

33. **polypodioides**; frond dichotomous, entire; spots of fructification linear, disposed along the midrib. (TAB. XIX.)

XVI. PADINA.

34. **Pavonia.** (TAB. XCI.)

XVII. ZONARIA.

35. **collaris**; procumbent, coriaceous, attached by the under surface; upper surface emitting cup-shaped, membranaceous, orbicular fronds, fringed round the margin. (TAB. CCCLIX.)

36. **parvula**; procumbent, attached by fibres from the lower surface, membranaceous, variously lobed; lobes free, rounded. (TAB. CCCXLI.)

XVIII. TAONIA.

37. **atomaria**; frond broadly wedge-shaped, deeply and irregularly cleft longitudinally; spores in wavy transverse lines, with intermediate scattered spores. (TAB. I. *Dictyota atomaria.*)

XIX. DICTYOTA.

38. **dichotoma**; frond regularly dichotomous, the upper segments narrower. (TAB. CIII.)

XX. STILOPHORA.

39. **rhizodes**; subsolid, much and irregularly branched; the lesser divisions dichotomous, attenuated; wart-like fructification densely covering the branches and ramuli. (TAB. LXX.)

40. **Lyngbyæi**; frond tubular, distended, dichotomous, with rounded axils, much attenuated upwards; ramuli forked, capillary; sori subdistant, in transverse lines. (TAB. CCXXXVII.)

XXI. DICTYOSIPHON.

41. **fœniculaceus.** (TAB. CCCXXVI.)

XXII. STRIARIA.

42. **attenuata**; branches and ramuli mostly opposite, tapering to each extremity. (TAB. XXV.)

XXIII. PUNCTARIA.

43. **latifolia**; oblong or obovate, pale green, blunt, suddenly tapering at the base into a minute stipe. (TAB. VIII.)
44. **plantaginea**; frond brownish-olive, cuneate at the base. (TAB. CXXVIII.)
45. **tenuissima**; frond sublinear, very thin and transparent. (TAB. CCXLVIII.)

XXIV. ASPEROCOCCUS.

46. **compressus**; frond compressed, flat, linear-lanceolate, obtuse; sori oblong. (TAB. LXXII.)
47. **Turneri**; stipe filiform, suddenly expanding into an inflated, obtuse, delicately membranaceous, bag-like frond. (TAB. XI.)
48. **echinatus**; cylindrical or clavate, much attenuated at the base. (TAB. CXCIV.)

XXV. LITOSIPHON.

49. **pusillus**; fronds filiform, very long, clothed with pellucid hairs; spores scattered. (TAB. CCLXX.)
50. **Laminariæ**; fronds short, stellately tufted, smooth, transversely banded, bands close together; spores scattered. (TAB. CCXCV.)

Order 5. CHORDARIACEÆ.

XXVI. CHORDARIA.

51. **flagelliformis**; branches lateral, subsimple, filiform, naked; peripheric filaments club-shaped. (TAB. CXI.)
52. **divaricata**; irregularly divided; branches subdichotomous, flexuous, having short, very patent, forked, scattered ramuli; peripheric filaments capitate. (TAB. XVII.)

XXVII. MESOGLOIA.

53. **vermicularis**; frond unequally distended, clumsy; branches irregularly pinnate, worm-like, thickened in the middle; ramuli copious. (TAB. XXXI.)
54. **Griffithsiana**; frond slender, equal; branches scattered, filiform, long, simple, nearly bare. (TAB. CCCXVIII.)
55. **virescens**; frond filiform, gelatinous; branches long, slender, villous; ramuli numerous, patent, short, linear, obtuse. (TAB. LXXXII.)

XXVIII. LEATHESIA.

56. **tuberiformis**; fronds at first stuffed with cottony fibres, at length hollow. (TAB. CCCXXIV.)
57. **Berkeleyi**; dark brown, depressed, solid. (TAB. CLXXVI.)

XXIX. RALFSIA.

58. **verrucosa**, Aresch.; frond orbicular, adhering by its whole under surface, warted in the middle. (TAB. XCVIII. *R. deusta.*)

(*Ralfsia deusta*, J. Ag., founded on the original *Zonaria deusta* of Agardh, is a different species.)

XXX. ELACHISTA.*

59. **fucicola**; tufts pencilled; filaments long, attenuated upwards; articulations once or twice as long as broad. (TAB. CCXL.)

60. **flaccida**; tufts pencilled; filaments long, flaccid, much attenuated at the base, the lower articulations half as long as broad, the upper of equal length and breadth. (TAB. CCLX.)

61. **curta**; filaments very short, club-shaped, rather rigid, rising from a tubercle; articulations as long as broad; spores pear-shaped. (TAB. CCCXXXII.)

62. **stellulata**; tufts very minute, stellate; filaments tapering at the base, slightly clavate, obtuse; articulations twice as long as broad, uniform. (TAB. CCLXI.)

63. **scutulata**; filaments short, rising from an oblong, convex, shield-like tubercle, composed of densely packed, dichotomous fibres; articulations 2–3 times as long as broad; spores oblong. (TAB. CCCXXIII.)

64. **pulvinata**; tufts very minute, globose; filaments much tapered to both ends, the basal joints 3–4 times, the middle 1½, the apical as long as broad. (TAB. XXVIII. *A.* *E. attenuata.*)

65. **velutina**; spreading in thin, indefinite velvety patches; filaments very minute, filiform; spores elliptical, pedicellate. (TAB. XXVIII. *B.*)

XXXI. MYRIONEMA.

66. **strangulans**; patches convex, confluent; vertical filaments clavate, densely set; spores obovate, on short stalks, rising from the decumbent filaments. (TAB. CCLXXX.)

67. **Leclancherii**; patches orbicular, thin at the edges, convex in the centre; spores on long pedicels. (TAB. XLI. *A.*)

68. **punctiforme**; patches globose; spores affixed to the vertical filaments, near their base. (TAB. XLI. *B.*)

69. **clavatum**; very minute, rather convex; filaments clavate, mostly bifid; spores obovate, pedicellate, affixed to the filaments. (TAB. CCCXLVIII.)

Order 6. ECTOCARPACEÆ.

XXXII. CLADOSTEPHUS.

70. **verticillatus**; branches slender; ramuli mostly forked, subdistant, regularly whorled. (TAB. XXXIII.)

71. **spongiosus**; branches thick and clumsy; ramuli mostly simple, irregularly whorled and densely imbricated. (TAB. CXXXVIII.)

XXXIII. SPHACELARIA.

72. **filicina**; shaggy at the base; stem slender, irregularly divided; branches lanceolate, erecto-patent, bi-tri-pinnate; pinnæ erect; pinnules multifid; all the axils very acute and narrow. (TAB. CXLII.)

73. **Sertularia**; slightly shaggy at the base; stem weak and slender, irregularly divided; branches linear, horizontally patent, tripinnate; pinnæ divaricate; pinnules multifid; all the axils very obtuse and wide. (TAB. CXLIII.)

74. **scoparia**; coarse and of large size, shaggy at the base; upper branches once or twice pinnated; pinnæ erecto-patent, awl-shaped, the lower ones pinnulate. (TAB. XXXVII.)

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* Incorrectly spelt *Elachistea* in the body of the work.

75. **plumosa**; filaments naked at the base, long, irregularly divided, inarticulate; branches pectinato-pinnate; pinnæ opposite, closely set, simple. (TAB. LXXXVII.)

76. **cirrhosa**; parasitical, naked at the base; filaments short, densely tufted, jointed throughout, simple or divided; branches pinnate; pinnæ opposite or irregular, of unequal length. (TAB. CLXXVIII.)

77. **fusca**; densely tufted, capillary, distantly and irregularly branched; branches very erect, subsimple; ramuli few, scattered, club-shaped or three-pronged; articulations twice as long as broad. (TAB. CXLIX.)

78. **radicans**; filaments erect, or decumbent and rooting, sparingly branched; branches simple, scattered, erect, naked; spores clustered, sessile, globose. (TAB. CLXXXIX.)

79. **racemosa**; spores pedunculate, in compound racemose, lateral clusters. (TAB. CCCXLIX.)

XXXIV. ECTOCARPUS.

80. **siliculosus**; tufts soft, yellowish-olive; filaments very slender, excessively branched; ultimate branchlets alternate; propagula stalked, subulate, attenuate to a fine point. (TAB. CLXII.)

81. **amphibius**; tufts short, soft, pale olive; filaments subdichotomous; ramuli scattered, subulate; articulations twice or thrice as long as broad; propagula linear-attenuate, mostly sessile. (TAB. CLXXXIII.)

82. **fenestratus**; pale olive-green, very slender, in small tufts; branches alternately and laxly decompound; articulations twice or thrice as long as broad; propagula stalked, at first clavate, afterwards elliptic-oblong, obtuse. (TAB. CCLVII.)

83. **fasciculatus**; tufts olivaceous, dense; branches set with alternate or secund fascicles of minute, secund ramuli; propagula sessile, secund, close together, ovate-acuminate or subulate. (TAB. CCLXXIII.)

84. **Hincksiæ**; tufted; filaments irregularly branched; branches flexuous, set with secund ramuli which are pectinated along their upper side; utricles conical, lining the inner face of the ultimate ramuli. (TAB. XXII.)

85. **tomentosus**; filaments interwoven into a sponge-like, branching frond; ramuli few; propagula stalked, linear-oblong or fusiform, obtuse. (TAB. CLXXXII.)

86. **crinitus**; filaments long, decumbent, stratified, sparingly branched; branches subsimple, distant; ramuli few, patent; spores globose, scattered, sessile; articulations twice or thrice as long as broad. (TAB. CCCXXX.)

87. **pusillus**; filaments tufted, interwoven, sparingly branched; branches distant, patent; ramuli few, divaricating; spores roundish-oblong, subsessile, frequently opposite. (TAB. CLIII.)

88. **distortus**; filaments densely matted, angularly bent, flaccid and fragile; branches divaricated, alternate or secund; ramuli horizontally patent, recurved, obtuse; spores obovate, subsessile. (TAB. CCCXXIX.)

89. **Landsburgii**; tufts intricate, small; filaments tenacious, zigzag, divaricately much branched; branches bristling with spine-like horizontal ramuli; articulations shorter than broad; dissepiments very narrow. (TAB. CCXXXIII.)

90. **littoralis**; tufts dense, interwoven, olive-brown; filaments coarse, much branched; ultimate branchlets patent, alternate or opposite; propagula forming oblong swellings in the branches. (TAB. CXCVII.)

91. **longifructus**; tufts large and feathery; filaments robust, excessively branched, decompound; branches mostly opposite, with short, spine-like ramuli; articulations as long as broad; propagula very long, linear-lanceolate, terminating the branches and ramuli. (TAB. CCLVIII.)

92. **granulosus**; olive, robust, slightly entangled; branches free, repeatedly divided; lesser branches and ramuli opposite, spreading; spores elliptical, dark-coloured, sessile. (TAB. CC.)

93. **sphærophorus**; filaments densely tufted, much branched; upper branches patent, opposite or in fours, having opposite, patent ramuli; spores globose, sessile, opposite one to the other, or to a branchlet. (TAB. CXXVI.)

94. **brachiatus**; branches opposite or quaternate, spreading; ramuli opposite, patent; propagula forming oblong swellings in the nodes of the lesser branches. (TAB. IV.)

95. **Mertensii**; distichous; branches opposite, of unequal length, closely set with short, slender, opposite ramuli; spores binate, immersed in the ramuli. (TAB. CXXXII.)

XXXV. MYRIOTRICHIA.

96. **clavæformis**; frond clavate; ramuli gradually longer upwards. (TAB. CI.)

97. **filiformis**; filiform, slender, beset at irregular intervals with oblong clusters of short ramuli. (TAB. CLVI.)

II. RHODOSPERMEÆ.

Order 7. RHODOMELACEÆ.

XXXVI. ODONTHALIA.

98. **dentata**; frond irregularly pinnate; branches deeply pinnatifid; laciniæ alternate, sharply toothed toward their truncate extremities. (TAB. XXXIV.) (*The colour on the plate is incorrect. This plant is of a deep blood-red colour when growing, but becomes dark on exposure to the air.*)

XXXVII. RHODOMELA.

99. **lycopodioides**; divided near the base into several, long, simple branches, which are densely set with multifid, slender ramuli. (TAB. L.)

100. **subfusca**; much branched; branches irregularly decompound, and clothed with pinnated branchlets mixed with scattered subulate ramuli; pinnules subulate. (TAB. CCLXIV.)

XXXVIII. BOSTRYCHIA.

101. **scorpioides**; frond flexuous, forked; branches bi-tri-pinnate; pinnæ and pinnulæ patent; apices strongly rolled inwards. (TAB. XLVIII.)

XXXIX. RYTIPHLÆA.

102. **pinastroides**; frond terete; lesser branches pectinato-pinnate, the pinnæ secund, with their tips inflexed. (TAB. LXXXV.)

103. **complanata**; brown-red, compressed, pinnate or bi-tri-pinnate; pinnules subulate, erect; axils very acute. (TAB. CLXX.)

104. **thuyoides**; stems terete, erect, alternately branched; branches erect, vir-

gate, pinnulate or bipinnulate, the pinnules short; capsules sessile. (TAB. CCXXI.)

105. **fruticulosa**; stems terete, diffuse, branched from the base; branches divaricating, pinnato-dichotomous, with short multifid ramuli; axils rounded; capsules sessile. (TAB. CCXX.)

XL. POLYSIPHONIA.

* *Primary tubes* 4–5 *; frond distinctly jointed throughout.*

106. **urceolata**; rigid, setaceous, full-red, loosely bundled; branches dichotomous, with scattered patent or reflexed ramuli; articulations 3–5 times as long as broad; dissepiments pellucid; capsules pitcher-shaped, constricted at the mouth. (TAB. CLXVII.)

107. **formosa**; flaccid, exceedingly slender, full red, densely tufted; branches dichotomous, with scattered, patent ramuli; articulations 5–10 times as long as broad; dissepiments pellucid; capsules pitcher-shaped, constricted at the mouth. (TAB. CLXVIII.)

(*P. stricta*, Harv. Man. p. 83, seems to be the young of this species?)

108. **pulvinata**; densely tufted; filaments creeping, throwing up erect, irregularly dichotomous stems, whose branches bear a few short, recurved ramuli; articulations 3–4 times as long as broad; capsules urn-shaped, stalked. (TAB. CII. *B.*)

109. **fibrata**; setaceous below, attenuated and capillary above, flaccid, gelatinous, alternately branched, with dichotomous, pencilled lesser branches, whose tips are remarkably fibrilliferous; axils patent; articulations of the branches 4–6 times longer than broad; capsules ovate, stalked. (TAB. CCVIII.)

110. **spinulosa**; articulate throughout; rigid, branched from the base, branches divaricate, decompound; ramuli short, spine-like, spreading; articulations as long as broad, three-striate. (TAB. CCCXX.)

111. **Richardsoni**; stem cartilaginous, setaceous; branches alternate, long, divaricated, set above with very patent, straight, forked ramuli; articulations 2–3 times longer than broad, veiny; tubes 5; capsules sessile, broadly ovate. (TAB. X.)

112. **Griffithsiana**; stem alternately branched, rigid; branches subsimple, with dichotomous or alternately multifid pencilled, slender ramuli; articulations once and half as long as broad, 3–4-striate; siphons four primary, with four external, secondary; capsules sessile. (TAB. CCXXVIII.)

113. **elongella**; setaceous, rigid below, flaccid above, dichotomous, with very patent axils; upper branches decomposed into multifid, pencilled, rose-red ramuli; articulations about as long as broad, 2–3-striate, the tubes very wide and dissepiments pellucid; capsules ovate, stalked. (TAB. CXLVI.)

* * *Primary tubes* 4 *; stem and branches subopake, or inarticulate.*

114. **elongata**; robust, cartilaginous, irregularly divided; ramuli pencilled, capillary, multifid, attenuated at base and apex; articulations once and half as long as broad, those of the stem and branches reticulated with veins; siphons four. (TAB. CCXCII. and CCXCIII.)

115. **violacea**; brown-red, purple, or sanguineous; stem inarticulate, veiny, robust, alternately branched; branches decompound, feathery, the ultimate ramuli very slender, multifid, fibrilliferous; articulations of the ramuli two-striate, 2–4 times as long as broad; capsules ovate. (TAB. CCIX.)

(*P. Grevillii*, Harv. Man. ed. 2. p. 86, I now consider to be merely a variety of this species, more sanguineous than usual.)

116. **Carmichaeliana**; stem inarticulate, percurrent, flexuous, rigid; branches lateral, divaricating; ramuli scattered, very patent, spinoso-multifid, articulate; articulations as long as broad, three-striate. (TAB. CCCXIX.)

117. **fibrillosa**; pale straw-colour or brown; stems inarticulate, marked with sinuous veins, robust, much branched; branches articulated near the apices only, beset with slender, finely divided, articulated ramuli; tips copiously fibrillose; articulations rather longer than their breadth; siphons four. (TAB. CCCII.)

* * * *Primary tubes* 7; *stem inarticulate.*

118. **Brodiæi**; stems inarticulate, robust; branches virgate, clothed with pencilled, multifid, flaccid, articulated ramuli; articulations of the ramuli 3–4-striate, longer than broad; siphons seven; capsules ovate, pedicellate. (TAB. CXCV.)

* * * * *Primary tubes* 6–7; *frond jointed throughout.*

119. **variegata**; brownish-purple, setaceous, rigid below, flaccid and capillary above, dichotomous, the lower axils patent; branches decompound; lower articulations very short, middle twice as long as broad, each marked with three broad, oblong cells, separated by pellucid spaces; siphons 6–7; capsules ovate, stalked. (TAB. CLV.)

* * * * * *Primary tubes* 8–20; *frond jointed throughout.*

120. **obscura**; densely matted, short; filaments creeping, throwing up erect, simple, secund branches; articulations short. (TAB. CII. *A.*)

121. **simulans**; slender, bushy, branched from the base; branches patent, decompoundly but irregularly pinnate; ramuli subulate; articulations once and half as long as broad; siphons about twelve; capsules ovate, sessile. (TAB. CCLXXVIII.)

122. **nigrescens**; robust, rigid, and rough with broken branches below, much branched and flaccid above; branches decompoundly pinnate; ramuli subulate; lower articulations short, upper once and half as long as broad; siphons about twenty; capsules sessile, ovate. (TAB. CCLXXVII.)

123. **affinis**; filaments elongate, rigid below, flaccid above; branches naked at the base, multifid and decompound pinnate above; ramuli very erect, subulate; articulations multistriate, the lower 2–3 times as long as broad, upper gradually shorter; siphons about sixteen. (TAB. CCCIII.)

124. **subulifera**; setaceous, flexuous, irregularly much branched; branches alternately decompound, spreading, the lesser divisions virgate; ramuli scattered, subulate, patent; siphons about thirteen. (TAB. CCXXVII.)

125. **atrorubescens**; setaceous, dark brownish-red, rigid, alternately braenhed; branches long, very erect, once or twice compounded; ramuli scattered, tapering to base and apex, simple or divided; articulations of stem 2–3 times as long as broad, of branches shorter, many-striate, the striæ curved; siphons about twelve; capsules broadly ovate. (TAB. CLXXII.)

126. **furcellata**; filaments elongated, flexuous, dichotomous; axils broad, rounded; ramuli multifid; articulations 3–5 times longer than broad. (TAB. VII.)

127. **fastigiata**; rigid, setaceous, dichotomous, fastigiate; articulations shorter than their breadth; siphons 16–18. (TAB. CCXCIX.)

128. **parasitica**; distichous, rigid, slender, full red, bi-tri-pinnate; pinnules closely set, alternate, subulate, acute; articulations about as long as broad, each marked with 3 or 4 broad, hexagonal cells, separated by pellucid spaces; capsules ovate, stalked. (TAB. CXLVII.)

129. **byssoides**; stems rigid, setaceous, distichously pinnate; branches patent, decompound, clothed with dichotomous single-tubed byssoid ramelli; articulations variable in length; siphons seven. (TAB. CCLXXXIV.)

XLI. DASYA.

130. **coccinea**; stems robust, rough with hair-like fibres, distichous; branches bi-tri-pinnate; pinnæ multifid, single-tubed, their articulations as long as broad. (TAB. CCLIII.)

131. **ocellata**; stems subsimple; ramelli quadrifarious, dichotomous, erecto-patent; stichidia linear-lanceolate, tapering to a point. (TAB. XL.)

132. **Arbuscula**; irregularly much branched; ramelli quadrifarious, dichotomous, patent or divaricate, scarcely attenuated; articulations 2–4 times as long as broad; stichidia elliptic-oblong, mucronate; capsules urceolate, with a long cylindrical neck. (TAB. CCXXIV.)

133. **venusta**; decompoundly pinnate; ramelli quadrifarious, exceedingly slender, many times dichotomous, much attenuated; articulations 5–6 times as long as broad; stichidia pedicellate, ovoid, much acuminate; capsules ovate-urceolate. (TAB. CCXXV.)

Order 8. LAURENCIACEÆ.

XLII. BONNEMAISONIA.

134. **asparagoides**; frond compressed; capsules stalked, opposite the cilia. (TAB. LI.)

XLIII. LAURENCIA.

135. **pinnatifida**; frond compressed, bi-tri-pinnate, the divisions alternate; ramuli linear, erecto-patent, simple or lobed. (TAB. LV.)

136. **cæspitosa**; cylindrical or subcompressed, narrow, repeatedly pinnate, pyramidal; branches and ramuli erecto-patent, scattered, distichous or spreading on all sides, truncate, scarcely tapering at the base. (TAB. CCLXXXVI.)

137. **obtusa**; cylindrical, repeatedly pinnate; branches patent; pinnæ and pinnulæ mostly opposite, the ultimate pinnules very short and obtuse. (TAB. CXLVIII.)

138. **dasyphylla**; cylindrical, decompoundly pinnate or irregularly branched; branches erecto-patent; ramuli much attenuated at the base, scattered, very obtuse. (TAB. CLII.)

139. **tenuissima**; frond terete; branches long and virgate, clothed with very slender, short ramuli, which taper at each end. (TAB. CXCVIII.)

XLIV. CHRYSYMENIA.

140. **clavellosa**; repeatedly pinnate; ramuli lanceolate, attenuate. (TAB. CXIV.)

141. **rosea**; pinnate or bipinnate; branches elliptic-oblong, compressed; pinnæ opposite, blunt. (TAB. CCCI. and TAB. CCCLVIII. *A.*)

XLV. CHYLOCLADIA.

142. **ovalis**; frond terete, branching, solid; branches clothed with simple, elliptical, jointed, tubular ramuli; capsules spherical. (TAB. CXVIII.)

143. **kaliformis**; pyramidal, erect, with a leading stem, which is distended, constricted at distant intervals, and whorled with articulato-constricted branches; ramuli opposite or whorled, moniliform; capsules globose. (Tab. CXLV.)

144. **reflexa**; dull purple; lower branches cylindrical, arched, attaching themselves by discs; secondary branches moniliform, spindle-shaped; ramuli few, scattered; capsules globose. (Tab. XLII.)

145. **parvula**; slender, irregularly branched; ramuli scattered; branches constricted at short intervals; capsules conical, with a prominent orifice. (Tab. CCX.)

146. **articulata**; frond tubular, strongly constricted throughout as if jointed, much branched, di-trichotomous, fastigiate; the upper branches often crowded; capsules obtusely conical. (Tab. CCLXXXIII.)

Order 9. CORALLINACEÆ.

XLVI. CORALLINA.

147. **officinalis**; upper articulations slightly obconical, round-edged, their upper angles blunt. (Tab. CCXXII.)

148. (**elongata**; "the lateral shoots of the branches slender and subulate, with long, cylindrical articulations."—*Johnst. Lith.* p. 221.)

I have seen no specimen of this, and have consequently been obliged to omit figuring it.

149. **squamata**; upper articulations obconical or obcordate, compressed, two-edged, their upper angles sharp and prominent. (Tab. CCI.)

XLVII. JANIA.

150. **rubens**; articulations cylindrical, unarmed, about four times as long as broad. (Tab. CCLII.)

151. **corniculata**; articulations of the branches obconical, compressed, their upper angles sharp and prominent. (Tab. CCXXXIV.)

XLVIII. MELOBESIA.

* *Frond thick and stony, branched or incrusting.*

152. **polymorpha**; attached to rocks, encrusting, thick; the surface smooth or tuberculated; ceramidia minute, depressed. (Tab. CCCXLV.)

153. **calcarea**; unattached, shrub-like, much branched; branches slender, spreading, tapering to a blunt point. (Tab. CCXCI.)

154. **fasciculata**; frond unattached, roundish or lobed, stony, much branched, fastigiate; branches solid, short, thick and crowded; apices depressed. (Tab. LXXIV.)

* * *Frond thin, foliated, free or partially attached to rocks.*

155. **agariciformis**; frond unattached, globular, hollow; foliations papery, erect, lobed and sinuated. (Tab. LXXIII.)

156. **lichenoides**; attached to rocks, free at the margins, foliaceous, variously lobed; foliations spreading, imbricated; ceramidia conical, prominent. (Tab. CCCXLVI.)

* * * *Frond minute, parasitic.*

157. **membranacea**; minute, dot-like, very thin, at length confluent; ceramidia one or two, depressed. (Tab. CCCXLVII. *A.*)

158. **farinosa**; minute, irregular in outline, rather thin, pallid, with 2–3 prominent ceramidia. (TAB. CCCXLVII. *B.*)

159. **verrucata**; thin, expanded, irregularly lobed, pallid, dotted over with minute, pimply ceramidia. (TAB. CCCXLVII. *C.*)

160. **pustulata**; thick, dull purple or green, oblong, incrusting; ceramidia numerous, large, prominent, conical. (TAB. CCCXLVII. *D.*)

XLIX. HILDENBRANDTIA.

161. **rubra.** (TAB. CCL.)

L. HAPALIDIUM.

162. **Phyllactidium,** *Kütz.*; flabelliform, variously lobed, colourless. (*Lithocystis Allmanni*, TAB. CLXVI.)

Common on Algæ round the British coasts; and, according to Kützing, found abundantly in the Mediterranean and in New Holland. Our figure represents the young plant, which afterwards becomes much more lobed and expanded.

Order 10. DELESSERIACEÆ.

LI. DELESSERIA.

163. **sanguinea**; stem short, cartilaginous, bearing oblong, transversely veined, entire, undulate leaves; veinlets opposite. (TAB. CLI.)

164. **sinuosa**; stem branched, bearing oblong or ovate, deeply sinuate or pinnatifid, toothed, pennate-ribbed leaves; nerves opposite. (TAB. CCLIX.)

165. **alata**; stem dichotomous, decompoundly branched, winged throughout with a narrow, membranous, pennate-nerved lamina. (TAB. CCXLVII.)

166. **angustissima**; frond very narrow, compressed, two-edged, distichously much branched, destitute of membrane. (TAB. LXXXIII.)

167. **Hypoglossum**; frond linear-lanceolate, repeatedly proliferous from the midrib with leaflets of similar form; leaflets acute. (TAB. II.)

168. **ruscifolia**; frond linear-oblong, repeatedly proliferous from the midrib with leaflets of similar form; leaflets round at the apex. (TAB. XXVI.)

LII. NITOPHYLLUM.

169. **punctatum**; frond very thin and delicate, nerveless, more or less regularly dichotomous, rose-red; axils rounded; sori large, oblong, scattered over the whole surface. (TAB. CCII. and CCIII.)

170. **Hilliæ**; frond thickish, veiny toward the base, roundish, irregularly cleft; segments oblong, obtuse; sori very minute, dot-like, densely scattered over the surface of the frond. (TAB. CLXIX.)

171. **Bonnemaisoni**; frond shortly stalked, fan-shaped, variously cleft; segments wedge-shaped; spots of granules minute, roundish, scattered over the surface. (TAB. XXIII.)

172. **Gmelini**; frond crisp, stipitate, veined at the base, fan-shaped, vaguely cleft; segments broadly wedge-shaped, waved, and curled; sori linear, marginal. (TAB. CCXXXV.)

173. **laceratum**; frond subsessile, rigidly membranous, traversed by branching veinlets, dichotomous; segments linear or cuneate, waved at the margin, obtuse; sori oblong, marginal. (TAB. CCLXVII.)

174. **versicolor**; stipitate; frond fan-shaped, circumscribed, subdichotomous or irregularly cleft, veinless, incrassated at the base; segments rounded. (TAB. IX.)

LIII. PLOCAMIUM.

175. **coccineum**; frond narrow, plano-compressed; ramuli subulate, secund, 3 or 4 consecutively; pectinate on their inner edges. (TAB. XLIV.)

Order 11. RHODYMENIACEÆ.

LIV. STENOGRAMME.

176. **interrupta**; stipitate, membranaceous, flabelliform, dichotomously cleft; apices obtuse; conceptacles forming a nerve-like line through the centre of each lobe. (TAB. CLVII.)

LV. RHODYMENIA.

177. **bifida**; thin and semitransparent, dichotomous; segments linear or cuneate; apices obtuse; tubercles mostly marginal, sessile; tetraspores transversely zoned. (TAB. XXXII.)

178. **laciniata**; frond thickish, subopake, bright red, flabelliform, deeply cleft; segments wedge-shaped, obtuse; margin curled and fringed with minute processes in which the tubercles are imbedded. (TAB. CXXI.)

179. **Palmetta**; stipes cylindrical, elongate, expanding into a fan-shaped, rose-red, dichotomously cleft frond; segments linear, with rounded interstices; margin entire, flat; tubercles sessile, marginal or scattered; sori elliptical, solitary in the expanded apices. (TAB. CXXXIV.)

180. **cristata**; fan-shaped, membranaceous, deeply laciniate; segments dilated upwards, repeatedly divided; lesser divisions laciniate at the ends and often fimbriate; tubercles spherical, marginal, sessile. (TAB. CCCVII.)

181. **ciliata**; frond thick, subopake, dull purplish-red, shortly stipitate, lanceolate or forked, irregularly pinnated with lanceolate or bifid segments; margin fringed with subulate processes, in which tubercles are imbedded. (TAB. CXXVII.)

182. **jubata**; frond thickish, flaccid, dull red, linear-lanceolate, cirrhose at the apex, pinnatifid; margin and often the disc beset with filiform processes. (TAB. CLXXV.)

183. **palmata**; frond coriaceous or membranaceous, dull purple, broadly wedge-shaped, irregularly cleft, palmate or dichotomous, sometimes laciniate, and very narrow; margin flat and even, simple or winged with leaflets; sori cloud-like, dispersed. (TAB. CCXVII. and CCXVIII.)

LVI. SPHÆROCOCCUS.

184. **coronopifolius**; much branched; branches alternate or subdichotomous, multifid; laciniæ acute, fringed with cilia; tubercles in the marginal cilia. (TAB. LXI.)

LVII. GRACILARIA.

185. **multipartita**; frond flat, tender, purplish-red, deeply cleft, irregularly dichotomous or fingered; branches linear-wedge-shaped; tubercles conical, very prominent, scattered plentifully over the segments. (TAB. XV.)

186. **compressa**; frond succulent, brittle, subcompressed, irregularly branched; branches long, tapering; tubercles prominent, ovate, scattered. (TAB. CCV.)

187. **confervoides**; frond filiform, cartilaginous, irregularly branched or subsimple; branches elongate, slender; tubercles scattered, sessile, roundish, subacute. (TAB. LXV.)

188. **erecta**; fronds many from a common disc, short, erect, filiform, sparingly branched; tubercles globose, clustered; tetraspores contained in terminal, lanceolate, pod-like ramuli. (TAB. CLXXVII.)

LVIII. HYPNEA.

189. **purpurascens**; purplish-red, excessively branched, bushy; branches alternate; ramuli multifid, attenuate; tubercles immersed in the ramuli. (TAB. CXVI.)

Order 12. CRYPTONEMIACEÆ.

LIX. GRATELOUPIA.

190. **filicina**; frond narrow, tapering, once or twice pinnated; pinnæ flexuous. (TAB. C.)

LX. GELIDIUM.

191. **corneum**; distichous; branches linear, narrowed at each end, pinnate or bi-tri-pinnate; pinnules opposite or alternate, patent, obtuse. (TAB. LIII.)

192. **cartilagineum**; several times pinnated; pinnæ and pinnulæ erecto-patent, with rounded axils, linear, obtuse. (TAB. CCCXXXVII.)

LXI. GIGARTINA.

193. **pistillata**; frond compressed, stipitate, flabellately branched; branches repeatedly forked, with rounded axils, naked or pinnated with short, horizontal ramuli; tubercles solitary or in pairs, on the ramuli. (TAB. CCXXXII.)

194. **acicularis**; cylindrical, irregularly branched, between pinnated and dichotomous; branches divaricating; ramuli few, recurved, subulate; tubercles scattered on the branches. (TAB. CIV.)

195. **Teedii**; frond flaccid, flattish, linear, acuminate, repeatedly pinnate; pinnæ horizontal, set with horizontal, spine-like ramuli. (TAB. CCLXVI.)

196. **mamillosa**; frond fan-shaped, dichotomous, plane, channelled; segments wedge-shaped; tubercles roundish or ovate, pedicellate, scattered over the disc of the frond. (TAB. CXCIX.)

LXII. CHONDRUS.

197. **crispus**; frond stipitate, thickish, cartilaginous; the segments wedge-shaped, variable in breadth; apices emarginate; axils obtuse; sori elliptical or oblong, scattered. (TAB. LXIII.)

198. **Norvegicus**; frond linear, dichotomous, flat, dull red; axils patent; apices rounded; favellidia minute, imbedded in the substance; nemathecia scattered over both surfaces. (TAB. CLXXXVII.)

LXIII. PHYLLOPHORA.

199. **rubens**; stipe short, expanding into the cuneate base of a narrow, obscurely midribbed, rigid, blood-red frond, which is repeatedly proliferous; tubercles scattered over the surface, wrinkled. (TAB. CXXXI.)

200. **membranifolia**; stem filiform, elongated, branched; branches expanding into broadly wedge-shaped, or fan-shaped, dichotomous dull purple laminæ; tubercles on short stalks, rising from the stem or the laminæ. (TAB. CLXIII.)

201. **Brodiæi**; stem filiform, branched; the branches terminating in forked, membranous leaflets, proliferous at the extremity; tubercles sessile on the tips of the segments. (TAB. XX.)

202. **palmettoides**; root a wide-spread disc; stem filiform, expanding into an oblong or cuneate, simple or once-forked, rose-coloured frond; sorus solitary, transverse, elliptical, immersed below the apex of the frond. (TAB. CCCX.)

LXIV. PEYSSONELIA.

203. **Dubyi**; frond membranaceous, orbicular or lobed, attached by the whole of its under surface. (TAB. LXXI.)

LXV. GYMNOGONGRUS.

204. **Griffithsiæ**; dichotomous, fastigiate; warts surrounding the stem. (TAB. CVIII.)

205. **plicatus**; horny, dark purple, entangled, wiry, irregularly branched; branches of various lengths, forked, with very wide axils; warts oblong, irregular, scattered. (TAB. CCLXXXVIII.)

LXVI. POLYIDES.

206. **rotundus.** (TAB. XCV.)

LXVII. FURCELLARIA.

207. **fastigiata.** (TAB. XCIV. and CCCLVII. *A.*)

LXVIII. DUMONTIA.

208. **filiformis**; frond undivided, attenuated to each extremity, pinnated with long, simple, tapering branches. (TAB. LIX. and CCCLVII. *B.*)

LXIX. HALYMENIA.

209. **ligulata**; frond compressed or flat, irregularly dichotomous or palmate; the segments attenuated. (TAB. CXII.)

LXX. GINANNIA.

210. **furcellata**; cylindrical, tender, uniformly dichotomous; apices obtuse. (TAB. LXIX.)

LXXI. KALLYMENIA.

211. **reniformis**; stipe short, terete, suddenly expanding into a roundish or irregularly cleft, blood-red frond. (TAB. XIII.)

212. **Dubyi**; stem compressed, gradually expanding into an obovate or cuneated, dull red lamina. (TAB. CXXIII.)

LXXII. IRIDÆA.

213. **edulis**; frond obovate. (TAB. XCVII.)

LXXIII. CATENELLA.

214. **Opuntia**; root creeeping; stems vaguely branched; internodes lanceolate or elliptical, four times as long as broad. (TAB. LXXXVIII.)

LXXIV. CRUORIA.

215. **pellita.** (TAB. CXVII.)

LXXV. NACCARIA.

216. **Wiggii**; frond filiform; branches alternate, repeatedly divided, attenuate; ramuli spindle-shaped, quadrifarious. (TAB. XXXVIII.)

LXXVI. GLOIOSIPHONIA.

217. **capillaris.** (TAB. LVII.)

LXXVII. NEMALEON.

218. **multifidum**; frond dichotomous, slightly branched, dull purplish-red; the axils rounded. (TAB. XXXVI.)

219. **purpureum**; stem undivided, attenuate at the base and apex; branches lateral, scattered, tapering, naked or having a second series of similar branchlets. (TAB. CLXI.)

LXXVIII. DUDRESNAIA.

220. **coccinea**; rosy red, irregularly much branched; branches moniliform, attenuated upwards, decompound. (TAB. CCXLIV.)

221. **divaricata**; pale red, excessively branched; branches horizontal, once or twice pinnated; ramuli divaricating. (TAB. CX.)

LXXIX. CROUANIA.

222. **attenuata.** (TAB. CVI.)

Order 13. CERAMIACEÆ.

LXXX. PTILOTA.

223. **plumosa**; cartilaginous, decompound; secondary branches bi-tri-pinnate; pinnæ and pinnulæ opposite, the latter subulate, inarticulate, but traversed by a jointed midrib; favellæ involucrate, pedicellate. (TAB. LXXX.)

224. **sericea**; flaccid; the pinnulæ articulate, formed of a single row of cells. (TAB. CXCI.)

LXXXI. MICROCLADIA.

225. **glandulosa.** (TAB. XXIX.)

LXXXII. CERAMIUM.

* *Smooth; frond uniformly coloured throughout.*

226. **rubrum**; robust, gradually attenuated, irregularly dichotomous with lateral, forked or multifid ramuli; apices hooked inwards; articulations unarmed, coloured; tetraspores whorled, immersed; favellæ involucrate, on the lateral branchlets. (TAB. CLXXXI.)

227. **botryocarpum**; filaments crooked at the base, robust, attenuated, irregularly dichotomous, with crowded, lateral, mostly simple ramuli; apices straight; articulations coated with cells, unarmed; dissepiments constricted; tetraspores whorled, immersed; favellæ terminating the lateral branchlets, involucrate. (TAB. CCXV.)

(The so-called "*favellæ*" of the text (under Pl. CCXV.) are diseased *tetraspores.*)

* * *Smooth; nodes coloured, internodes colourless.*

228. **decurrens**; robust, attenuated, dichotomous, with lateral dichotomous

branchlets; apices hooked inwards; internodes partially clothed with coloured cells, which extend from the nodes, but leave a colourless band in the centre of each internode. (TAB. CCLXXVI.)

229. **Deslongchampsii**; subsetaceous, attenuated, irregularly dichotomous, with or without lateral ramuli; apices straight, spreading; internodes colourless, the lower thrice as long as broad, upper very short; dissepiments purple, scarcely swollen; tetraspores whorled. (TAB. CCXIX.)

230. **diaphanum**; filaments setaceous, attenuated upwards, irregularly dichotomous, with short, lateral, dichotomous ramuli; internodes colourless, the lower long; nodes swollen, coloured; tetraspores whorled in the nodes; favellæ subterminal, involucrate. (TAB. CXCIII.)

231. **gracillimum**; excessively slender, very flaccid, dichotomous, with minute, flabelliform, dichotomous, lateral ramuli; internodes colourless, long; nodes opake, purple; favellæ on the lateral ramuli, with a spreading involucre. (TAB. CCVI.)

232. **strictum**; capillary, dichotomous, all the divisions straight and erect, with narrow, acute axils; apices slightly incurved; internodes colourless; nodes (smooth or hairy) opake, purple; favellæ near the ends of the branches, involucrate; spores erumpent, whorled. (TAB. CCCXXXIV.)

233. **nodosum**; capillary, rigid, dichotomous, fastigiate; axils very patent; articulations pellucid, 4–6 times as long as broad; dissepiments swollen; tetraspores erumpent, on the outer edge of short ramuli; favellæ near the tips of short ramuli. (TAB. XC.)

234. **fastigiatum**; capillary, flaccid, dichotomous, level-topped, rosy; axils acute; internodes pellucid, 4–6 times longer than broad, the upper short and coloured; nodes coated with cells, not swollen; favellæ subterminal, involucrate. (TAB. CCLV.)

* * * *Nodes armed with spines or prickles.*

235. **flabelligerum**; setaceous, attenuated upwards, flabellately branched, irregularly dichotomous, with lateral, forked ramuli; the internodes clothed with coloured cellules; apices nearly straight; nodes contracted, each armed on the outer edge with a single, minute, subulate, coloured, 3-jointed prickle; tetraspores erumpent, whorled round the joint. (TAB. CXLIV.)

236. **echionotum**; dichotomous, fastigiate, with pellucid internodes; apices involute; nodes armed with numerous, slender, scattered, subulate, colourless, 1-jointed prickles; tetraspores solitary, erumpent, on the outer edge of the node; favellæ subtended by several, strongly incurved ramuli. (TAB. CXLI.)

237. **acanthonotum**; dichotomous, fastigiate, with pellucid internodes; apices strongly involute; nodes armed on the outer edge with a single, robust, broadly subulate, coloured, three-jointed prickle; tetraspores erumpent, whorled round the node; favellæ subtended by a short ramulus. (TAB. CXL.)

238. **ciliatum**; dichotomous, fastigiate, with pellucid internodes; apices strongly involute; nodes whorled with several robust, subulate, 3-jointed prickles; tetraspores alternating with the prickles; favellæ subtended by two or three ramuli. (TAB. CXXXIX.)

LXXXIII. SPYRIDIA.

239. **filamentosa**; irregularly branched, subopake; branches set with setaceous ramuli. (TAB. XLVI.)

LXXXIV. GRIFFITHSIA.

* *Branches set with short ramelli.*

240. **equisetifolia**; stems robust; branches whorled throughout with closely imbricated, incurved, many times forked ramelli. (Tab. LXVII.)

241. **simplicifilum**; stems slender, irregularly branched, whorled with imbricated, straight, once-forked ramelli. (Tab. CCLXXXVII.)

242. **barbata**; dichotomous, slender; upper articulations emitting opposite or whorled, byssoid, dichotomous, short ramelli, to which the tetraspores are attached; favellæ stalked. (Tab. CCLXXXI.)

* * *Stems dichotomous, naked.*

243. **Devoniensis**; very slender, flaccid, dichotomous, the lower axils wide, the upper very acute; articulations cylindrical, 7–8 times as long as broad; involucres of tetraspores whorled round the dissepiments of the branches. (Tab. XVI.)

244. **corallina**; dichotomous, gelatinous; articulations pear-shaped, the ultimate ellipsoid; involucres sessile, those with tetraspores whorled round the branch, with favellæ lateral. (Tab. CCXIV.)

245. **secundiflora**; filaments ultra-setaceous, irregularly dichotomous; axils acute; branches fastigiate, obtuse, not tapering; articulations cylindrical, 2–4 times as long as broad, with a very wide border. (Tab. CLXXXV.)

246. **setacea**; filaments setaceous, straight, rigid, di-trichotomous; axils very acute; branches gradually attenuated to a point; articulations cylindrical, 5–6 times as long as broad; involucres, of both kinds, pedunculate, lateral. (Tab. CLXXXIV.)

LXXXV. WRANGELIA.

247. **multifida**; stems setaceous, jointed, pinnate or bipinnate; ramuli opposite or whorled, pinnato-multifid. (Tab. XXVII.)

LXXXVI. SEIROSPORA.

248. **Griffithsiana.** (Tab. XXI.)

LXXXVII. CALLITHAMNION.

* *Ramuli opposite.*

249. **Plumula**; stems dichotomous, articulated; each articulation bearing a pair of short, recurved plumules, pectinated on their upper margin. (Tab. CCXLII.)

250. **cruciatum**; densely tufted, subdichotomous, articulate; branches furnished at each joint with two or four, opposite or quaternate, short, pinnated ramuli; tetraspores elliptical, at the base of the ramuli. (Tab. CLXIV.)

251. **floccosum**; capillary, very flaccid, remotely branched; branches alternate, articulated, every joint bearing a pair of minute, opposite, spine-like ramuli; tetraspores elliptical, pedicellate. (Tab. LXXXI.)

252. **Turneri**; filaments rising from creeping fibres, simple or compound, once or twice pinnated with opposite, spreading ramuli; articulations of the main filaments 5–10 times as long as broad; tetraspores clustered, racemose or corymbose; favellæ involucred, stalked. (Tab. CLXXIX.)

253. **barbatum**; irregularly branched; branches alternate, subsimple, naked, or pinnulated with minute, opposite, spine-like ramuli; articulations twice as long as broad. (Tab. CLXV.)

254. **Pluma**; minute, rising from creeping filaments; stems erect, simple or branching; branches naked below, pinnated above; pinnæ erect, opposite, close; tetraspores globose, on short processes of the pinnules. (Tab. CCXCVI.)

* * *Stems shrubby, robust, more or less opake. Ramuli alternate.*

255. **arbuscula**; stems shrubby, opake, naked below, robust, much branched; branches densely set on all sides with minute imbricated plumules; ultimate pinnules simple or forked, recurved, their articulations twice as long as broad; tetraspores globose, lining the inner face of the pinnules. (Tab. CCLXXIV.)

256. **Brodiæi**; stem subopake, veiny, obscurely jointed, slender; branches lateral, patent, closely set with quadrifarious secondary branches; plumules simply pinnate, the pinnæ sometimes ramulose at the tip; tetraspores oval, sessile near the tips of the pinnules; favellæ bilobed, on the secondary branches. (Tab. CXXIX.)

257. **tetragonum**; outline of the frond ovate; stem thick, setaceous, opake, veiny, set with quadrifarious, lateral branches; penultimate branches articulate, set with short, alternate, level-topped plumules; pinnules incurved, constricted at the base, suddenly acuminate, their articulations once and half as long as broad; tetraspores very minute, oval, subterminal. (Tab. CXXXVI.)

258. **brachiatum**; character of *C. tetragonum*, except that the lowermost plumules are reduced to subulate ramuli; and the pinnules are not constricted at base, and taper *gradually* (not suddenly) at the apex. (Tab. CXXXVII.)

259. **tetricum**; rigid, shrubby; stem and branches robust, shaggy below, plumulate above; plumules crowded, simply pinnate; pinnæ acute, tapering at the base, erecto-patent; articulations twice or thrice as long as broad; tetraspores elliptical, minute, sessile on short lateral processes of the pinnæ. (Tab. CLXXXVIII.)

260. **Hookeri**; stem setaceous, nearly opake, pinnatedly much branched; branches decompound, spreading, flexuous, densely plumulate; plumules naked below, pinnate or sub-bipinnate above, the pinnæ horizontal or divaricating, ramulose at the tips; articulations 2–3 times as long as broad; tetraspores numerous, sessile on the pinnules. (Tab. CCLXXIX.)

* * * *Main stems slender, evidently jointed; branches decompound-pinnate. Ramuli alternate.*

261. **roseum**; much and loosely branched; secondary branches long, flexuous, distichously plumulate; plumules lax, simply pinnate; pinnæ long, spreading, curved; articulations 4–5 times as long as broad; tetraspores elliptical, secund, four or five on each pinna. (Tab. CCXXX.)

262. **byssoideum**; exceedingly slender, and flaccid, decompound; plumules long, flexuous, pinnate or sub-bipinnate; articulations of the branches eight, of the ramuli four times as long as broad; tetraspores one or two, sessile near the base of the pinnules. (Tab. CCLXII.)

263. **polyspermum**; tufts globose; filaments slender, much branched, secondary branches distichously plumulate; plumules long and narrow, simply pinnate; pinnæ short, simple, spine-like, patent; articulations 4–5 times as long as broad; tetraspores globose, lining the inner face of the pinnæ. (Tab. CCXXXI.)

264. **purpurascens,** Sm. E. Bot. t. 2465. (*Unknown to me.*)

265. **fasciculatum**; plumules long, erect, linear-obovate, truncate; pinnæ flexuous, the lower simple, appressed, the upper erecto-patent, ramulose near the tip; articulations of the branches veiny, thrice, of the ramuli once or twice as long as broad, with contracted dissepiments. (TAB. CCVIII.)

266. **Borreri**; much branched, subdistichous, slender; branches set with plumules which are bare of ramuli in their lower half, and simply pinnate in their upper; pinnæ patent; articulations of the branches 2–5 times, of the pinnæ twice, as long as broad; tetraspores roundish, sessile on the inner face of the pinnules. (TAB. CLIX.)

267. **affine**; much branched and bushy; stem veiny; secondary branches long, densely plumulate; plumules very narrow, simply pinnate; pinnæ short, erect, the upper longest, crowded at the tips; articulations of the branches 3–4, of the pinnæ once and half as long as broad; tetraspores solitary, super-axillary. (TAB. CCCXXXI.)

268. **tripinnatum**; distichous, capillary, decompound-pinnate; plumules obovate, tripinnate above; the lower pinnæ short and abortive; each pinna having at its axil a minute pinnule; tetraspores oval, lateral on the axillary pinnules. (TAB. LXXVII.)

269. **gracillimum**; distichously branched, fan-shaped; stems capillary, decomposito-pinnate; plumules bi-tri-pinnate; articulations of the stem 3–4, of the pinnæ 2–3 times as long as broad; tetraspores terminating the ultimate pinnules. (TAB. V.)

270. **thuyoideum**; capillary, distichously decompound, and repeatedly pinnate; plumules bi-tri-pinnate, lanceolate; articulations variable; tetraspores on the tips of the ultimate pinnules. (TAB. CCLXIX.)

* * * * *Stems articulate; branches and ramuli dichotomous.*

271. **corymbosum**; setaceous below, byssoid above, excessively branched; lesser branches repeatedly dichotomous, level-topped; ramuli many times forked; articulations of the branches 8–10 times as long as broad; tetraspores solitary and axillary, sessile. (TAB. CCLXXII.)

272. **spongiosum**; stems robust, opake and veiny; branches quadrifarious, thickly clothed with dichotomous ramuli; axils patent; apices bifid; articulations of the branches swollen at the joints, twice or thrice as long as broad. (TAB. CXXV.)

273. **pedicellatum**; setaceous, pellucid, jointed throughout, irregularly divided; lesser branches dichotomous; apices very obtuse; articulations several times as long as broad; tetraspores stalked, pear-shaped, axillary. (TAB. CCXII.)

* * * * * *Of small size and densely tufted, or minute parasites.*

274. **Rothii**; widely spreading, densely tufted; filaments very short, subdichotomous; branches very erect, straight, simple; articulations twice as long as broad; tetraspores oval, clustered, on short subterminal, corymbose ramuli. (TAB. CXX. *B.*)

275. **floridulum**; tufts very dense, globose, fastigiate; filaments slender, dichotomous; branches very erect, straight, simple; articulations thrice as long as broad; tetraspores oval, on short secund pedicels, along the branches. (TAB. CXX. *A.*)

276. **mesocarpum**; rising from creeping filaments; stems erect, subsimple; branches alternate, very erect, naked or nearly so; articulations 4–5 times as long as broad; tetraspores elliptical, on long, simple or forked, lateral pedicels. (TAB. CCCXXV.)

277. **sparsum**; parasitical, minute, scattered; filaments tufted, sparingly branched; branches simple, spreading, unequal; articulations 2–3 times as long as broad. (TAB. CCXCVII.)

278. **Daviesii**; rose-red, minute, tufted, much branched; branches curved; ramuli longish, crowded toward the axils of the secondary branches; tetraspores on the axillary ramuli, stalked. (TAB. CCCXIV.)

279. **virgatulum**; rose-red, minute, tufted, much branched; branches long and straight, alternate or secund; ramuli from every joint, short, obtuse, mostly secund; articulations thrice as long as broad; tetraspores scattered. (TAB. CCCXIII.)

III. CHLOROSPERMEÆ.

Order 14. SIPHONACEÆ.

LXXXVIII. CODIUM.

280. **Bursa**; frond spherical, hollow. (TAB. CCXC.)

281. **adhærens**; frond forming a velvety crust on the surface to which it adheres. (TAB. XXXV. *A*.)

282. **amphibium**; fronds minute, erect, cylindrical, simple or nearly so, obtuse, aggregated in widely spreading strata. (TAB. XXXV. *B*.)

283. **tomentosum**; frond dichotomous. (TAB. XCIII.)

LXXXIX. BRYOPSIS.

284. **plumosa**; branches naked below, closely pinnated above the middle; pinnæ subdistichous. (TAB. III.)

285. **hypnoides**; slender, very much branched; ramuli capillary, ramellose towards the tips, irregularly inserted. (TAB. CXIX.)

XC. VAUCHERIA.

286. **submarina**; tufted, dichotomous, fastigiate; sporangia numerous, lateral, sessile, ovate or lanceolate. (TAB. CCCL. *B*.)

287. **marina**; tufted; branches few, long, obtuse; sporangia solitary, obovate, pedicellate, lateral. (TAB. CCCL. *A*.)

288. **velutina**; filaments creeping; branches short, erect, fastigiate, woven into a velvety stratum; sporangia globose, solitary, lateral, on short stalks. (TAB. CCCXXI.)

Order 15. CONFERVACEÆ.

XCI. CLADOPHORA.

289. **Brownii**; tufts cushion-like, dense, fastigiate; filaments interwoven, flexuous, slightly branched; branches subsimple; articulations thickened upwards, 4–5 times as long as broad. (TAB. XXX.)

290. **repens**; tufts dense, globular; filaments rooting below, slightly branched; branches erect, sub-simple; ramuli few; articulations cylindrical, 10–20 times as long as broad. (TAB. CCXXXVI.)

291. **pellucida**; rigid, erect, setaceous, dark green, di-trichotomous; axils of

the branches very acute; dissepiments only at the forking of the branches and ramuli; articulations very long. (TAB. CLXXIV.)

292. **rectangularis**; filaments loosely tufted, setaceous, rigid; branches opposite, horizontal, distant, set with short, opposite, very patent ramuli; articulations 2–3 times as long as broad. (TAB. XII.)

293. **Macallana**; filaments setaceous, rigid, flexuous, loosely bundled, much branched; branches alternate, very patent; ramuli short, recurved, simple, obtuse; articulations twice or thrice as long as broad. (TAB. LXXXIV.)

294. **Hutchinsiæ**; filaments setaceous, rigid, crisp, glaucous-green, flexuous, loosely tufted; ramuli erecto-patent, simple or pectinulate on the inner face; apices very obtuse; articulations 2–3 times as long as broad. (TAB. CXXIV.)

295. **diffusa**; filaments subsetaceous, loosely tufted, rigid, full green, flexuous, much branched; branches distant, irregularly subdivided, or subdichotomous, ramulose above; ramuli simple, secund; articulations 3–4 times as long as broad. (TAB. CXXX.)

296. **nuda**; rigid, slender, straight, dull green, sparingly dichotomous; branches few, scattered, appressed; articulations many times longer than broad. (TAB. CCCLI.)

297. **rupestris**; capillary, rigid, dark green, straight, bushy; branches erect, crowded, densely clothed with appressed, opposite or alternate ramuli; articulations 3–4 times as long as broad. (TAB. CLXXX.)

298. **lætevirens**; much branched, bushy, yellow-green; branches crowded, repeatedly divided, flexuous; ramuli secund, blunt, of few articulations; articulations of the branches six times, of the ramuli thrice, as long as broad. (TAB. CXC.)

299. **flexuosa**; capillary, tufted, flexuous, pale green, much branched; branches set with curved secondary or tertiary branches, which are pectinated with short, simple, secund, curved ramuli; articulations 3–4 times as long as broad. (TAB. CCCLIII.)

300. **gracilis**; filaments very long, capillary, flexuous, silky, much branched, yellow-green; main branches angularly bent; ramuli pectinate, secund, much attenuated, elongate; articulations 3–5 times longer than broad. (TAB. XVIII.)

301. **Balliana**; filaments very long, extremely slender and soft, grass-green, excessively branched; penultimate branches virgate and set with slender, secund, short ramuli; articulations of the branches eight to ten times, of the ramuli six to eight times, as long as broad. (TAB. CCCLVI.)

302. **Rudolphiana**; filaments very long and slender, flexuous, soft, much branched, yellow-green; branches irregular; ultimate ramuli very long, pectinate, patent; articulations many timesl onger than broad. (TAB. LXXXVI.)

303. **refracta**; filaments capillary, bright green, very much branched; secondary branches quadrifarious, repeatedly divided; branchlets closely set and widely spreading; ramuli pectinated; articulations twice or thrice as long as broad. (TAB. XXIV.)

304. **albida**; tufts dense, elongate, silky or spongy, soft; filaments exceedingly slender, decompound; branches patent, the upper ones frequently opposite; ramuli opposite or secund; articulations 4–5 times as long as broad. (TAB. CCLXXV.)

305. **lanosa**; filaments slender, short, yellow-green, forming dense, globular

tufts; branches virgate, erect, subdistant, straight, alternate; ramuli few, scattered; axils very acute; lower articulations twice, upper six times as long as broad. (Tab. VI.)

306. **uncialis**; tufts short, spongy, divided; filaments flexuous, sparingly branched, interwoven and rooting; ramuli secund, distant; articulations twice as long as broad. (Tab. CCVII.)

307. **arcta**; tufts very dense, starry, bright green; filaments matted at the base, much branched; branches straight, crowded, very erect; ramuli appressed; articulations in the older parts once or twice as long as broad, in the younger many times longer. (Tab. CXXXV.)

308. **glaucescens**; tufts dense, glaucous green; filaments very slender, zigzag, much branched; branches erect, lesser ones pectinate, with very erect, close-set, straight, elongated ramuli; articulations thrice as long as broad. (Tab. CXCVI.)

309. **falcata**; densely tufted, dark green; filaments rigid, curved, irregularly divided; branches zigzag, decompound, the lesser branches arched, or incurved and falcate, ramulose on their inner faces; ramuli blunt; articulations 3–4 times as long as broad, with a dense endochrome and pellucid dissepiments. (Tab. CCXVI.)

310. **Magdalenæ**; filaments capillary, blackish-green, short, decumbent, matted together, slightly branched, angularly bent; branches divaricate, dichotomous; ramuli few, falcate; articulations three to four times as long as broad. (Tab. CCCLV. *A.*)

311. **Gattyæ**; filaments short, dingy green, capillary, matted together, densely tufted, dichotomous, flexuous, with few ramuli; articulations once and half as long as broad. (Tab. CCCLV. *B.*)

312. **flavescens**; forming pale yellowish strata; filaments slender, sparingly divided, subdichotomous, flexuous; ramuli long, alternate or secund; articulations 8–9 times as long as broad. (Tab. CCXCVIII.)

313. **fracta**; tufts entangled, often floating, dull green; filaments rigid, distantly branched, subdichotomous, with wide axils; ramuli few, alternate or secund; articulations 3–6 times as long as broad, at length elliptical. (Tab. CCXCIV.)

XCII. RHIZOCLONIUM.

314. **riparium**; slender, pale green, flaccid, angularly bent; articulations about twice as long as broad. (Tab. CCXXXVIII.)

315. **Casparyi**; filaments extremely slender, pale, interwoven, curved and bent; angles emitting root-like branches; articulations 2–6 times longer than broad; endochrome granular. (Tab. CCCLIV. *B.*)

XCIII. CONFERVA.

* *Decumbent, stratified.*

316. **arenicola**; threads soft, extremely fine, matted, very pale green; articulations once and half as long as broad. (Tab. CCCLIV. *A.*)

317. **arenosa**; filaments slender, straightish, rigid, forming wide strata; joints 3–5 times as long as broad. (Tab. LIV. *C.*)

318. **litorea**; filaments thick, rigid, crisped, loosely bundled, dull green; articulations once and half as long as broad, here and there swollen in pairs and discoloured. (Tab. CCCXXXIII.)

319. **Linum**; filaments very thick, of great length, curled, rigid, loosely bundled; articulations as long as broad. (TAB. CL. *A.*)

320. **sutoria**; filaments setaceous, long, flexuous, dark green; articulations once and half as long as broad. (TAB. CL. *B.*)

321. **tortuosa**; filaments rigid, slender, curled, interwoven in spreading strata; joints twice or thrice as long as broad. (TAB. LIV. *A.*)

322. **implexa**; filaments very slender, rather flaccid, forming entangled, bright-green strata; joints as long as, or longer than broad. (TAB. LIV. *B.*)

* * *Fixed by the base, tufted.*

323. **Melagonium**; filaments erect, straight, robust, slightly tufted, stiff and wiry, dark green; joints twice as long as broad. (TAB. XCIX. *A.*)

324. **ærea**; filaments fixed, long, setaceous, tufted, straight, harsh, brittle, yellow-green; joints as long as broad. (TAB. XCIX. *B.*)

325. **collabens**; filaments long, straight, tufted, variable in diameter, gelatinous and flaccid, æruginous green; articulations as long as broad, with dense, granular endochrome. (TAB. CCCXXVII.)

326. **bangioides**; filaments long, slender, soft, lubricous, wavy; articulations twice as long as broad, containing at maturity a dense green mass; dissepiments broad and pellucid. (TAB. CCLXVIII.)

327. **Youngana**; filaments short, tufted, nearly straight; articulations once or twice as long as broad; dissepiments contracted. (TAB. CCCXXVIII.)

328. **clandestina**, Berk. Gl. Br. Alg. t. 13. f. 1. (*Unknown to me.*)

XCIV. OCHLOCHÆTE.

329. **Hystrix.** (TAB. CCXXVI.)

Order 16. ULVACEÆ.

XCV. ENTEROMORPHA.

330. **cornucopiæ**; gregarious, small; fronds stipitate, suddenly dilated, at length torn, plaited at the margin. (TAB. CCCIV.)

331. **intestinalis**; simple, clavate, at length inflated, tapering much to the base. (TAB. CLIV.)

332. **compressa**; branching, compressed, more or less compounded; branches subsimple, obtuse, much attenuated at the base. (TAB. CCCXXXV.)

333. **Linkiana**; cylindrical, reticulated, very pale, membranaceous (rigid when dry), much branched; branches alternate, spreading. (TAB. CCCXLIV.)

334. **erecta**; frond cylindrical, filiform, slender; branches erect, opposite or alternate, all attenuated to a point; ramuli capillary, erecto-patent; cells rectangular, filled with endochrome. (TAB. XLIII.)

335. **clathrata**; cylindrical, filiform, slender, reticulated, much branched; branches decompound, spreading, set with divaricated, spine-like ramuli. (TAB. CCCXL.)

336. **ramulosa**; frond subcompressed, irregularly branched; main divisions long and subsimple; lateral branches curved and twisted, everywhere clothed with short, divaricated, spine-like ramuli. (TAB. CCXLV.)

337. **Hopkirkii**; frond byssoid, excessively branched; branches erect, attenuate, bearing scattered, subulate ramuli; reticulations very large, each areole containing one or two minute grains. (TAB. CCLXIII.)

338. **percursa**; capillary, entangled, simple, compressed, subsolid, reticulated; cells quadrate, two or more in the breadth of the frond; endochrome filling the cell. (TAB. CCCLII.)

339. **Ralfsii**; capillary, simple or nearly so, subsolid, largely reticulated; areoles large, hyaline, 2–4 in the breadth of the frond, each containing a bright-green grain of endochrome. (TAB. CCLXXXII.)

XCVI. ULVA.

340. **latissima**; frond broadly ovate or oblong, membranous, full-green. (TAB. CLXXI.)

341. **Lactuca**; frond very delicate, at first saccate; then cleft to the base into numerous laciniated flat segments. (TAB. CCXLIII.)

342. **Linza**; frond linear-lanceolate, undulate. (TAB. XXXIX.)

XCVII. PORPHYRA.

343. **laciniata**; frond deeply and irregularly cleft. (TAB. XCII.)

344. **vulgaris**; frond simple, lanceolate, wavy. (TAB. CCXI.)

344.* *P. miniata*, Ag.—Carm. Hook. Br. Fl. v. ii. p. 310. (*Unknown to me.*)

XCVIII. BANGIA.

345. **fuscopurpurea**; stratum brownish-purple; filaments long, simple, decumbent, here and there constricted; granules several in each transverse band. (TAB. XCVI.)

346. **ciliaris**; filaments very minute, erect, simple, straight, compressed, purple; grains two or three in each transverse band, globose, sometimes solitary. (TAB. CCCXXII.)

347. **ceramicola**; filaments parasitical, very slender, elongate, rosy; articulations once or twice as long as broad, longitudinally striate; the endochrome at length globular. (TAB. CCCXVII.)

348. **carnea,** Dillw. t. 84. (*Unknown to me.*)

349. (?) **elegans**; filaments minute, dichotomous, with wide axils; granules binate, in a single row. (TAB. CCXLVI.)

Order 17. OSCILLATORIACEÆ.

XCIX. RIVULARIA.

350. **plicata**; fronds gregarious, gelatinous, plaited, often hollow and at length ruptured, dull dark green; filaments wavy, associated in dichotomous series. (TAB. CCCXV.)

351. **atra**; globose, minute, very firm and smooth, glossy, black-green; filaments densely packed. (TAB. CCXXXIX.)

352. **applanata,** Carm. in Hook. Br. Fl. vol. ii. p. 392. (*Unknown to me.*)

353. **nitida**; frond subgelatinous, lobed and plaited, hollow, lubricous, dark shining green. (TAB. LXVIII.)

C. SCHIZOSIPHON.

354. **Warreniæ.** (TAB. CCCXVI.)

CI. SCHIZOTHRIX.

355. **Cresswellii**; tufts pulvinate; filaments very slender, fastigiate, collected into branching bundles. (TAB. CLX.)

CII. CALOTHRIX.

356. **confervicola**; filaments short, tufted, glaucous green, opake, blunt, rigid, nearly straight. (TAB. CCLIV.)

357. **mucor,** Ag.—Br. Fl. vol. ii. p. 367. (*Unknown to me.*)

358. **luteola**; filaments exceedingly minute, slender, scattered, filiform, obtuse, hyaline or containing light green endochrome. (TAB. CCCXLII.)

359. **scopulorum**; stratum velvety, dirty green; filaments flexuous, subulate, subattenuate, simple. (TAB. LVIII. *B.*)

360. **fasciculata**; stratum widely spreading, velvety, dark green; filaments straight, subulate, attenuated, fasciculately pseudo-branched. (TAB. LVIII. *A.*)

361. **pannosa**; filaments long, much curled, and densely interwoven into lamellated tufts or honey-combed strata; endochrome filling the tube, dark green, densely annulated. (TAB. LXXVI.)

362. **semiplena**; filaments long, slender, tough, flexuous, densely interwoven in lamellated tufts; endochrome glaucous, frequently interrupted, leaving parts of the tube empty. (TAB. CCCIX.)

363. **hydnoides**; patches widely spreading, dark green; filaments flexuous, decumbent, their tips cohering in rigid, erect, tooth-like fascicles; border rather wide. (TAB. CCCVI.)

364. **cæspitula**; tufts convex, soft, cushioned, blackish-green; filaments densely packed, flexuous, obtuse, not attenuated; border narrow. (TAB. CCCV.)

CIII. LYNGBYA.

* *Tube continuous; endochrome cylindrical, imperfectly annulated.*

365. **majuscula**; strata of large dimensions, blackish-green; filaments thick, bundled, twisted, obtuse; endochrome densely annulated. (TAB. LXII.)

366. **ferruginea**; filaments slender, flaccid, forming a stratum of a verdigris-green colour, which at length changes to pale chestnut. (TAB. CCCXI.)

* * *Tube imperfectly articulated; endochrome distinctly annulated, with pellucid interspaces.*

367. **Carmichaelii**; filaments very long, thickish, curled, grass-green; tube imperfectly jointed. (TAB. CLXXXVI. *A.*)

368. **speciosa**; filaments very long, thick, flaccid, straight, at length curled, the margin slightly crenate, yellow-green, glossy when dry; tube imperfectly jointed. (TAB. CLXXXVI. *B.*)

369. **flacca**; filaments short, tufted, nearly straight, occasionally proliferous, articulated; articulations shorter than their breadth; endochrome at length much contracted. (TAB. CCC.)

370. **Cutleriæ**; exceedingly slender, soft, articulated; articulations as long as broad, the endochrome at length spherical. (TAB. CCCXXXVI.)

CIV. MICROCOLEUS.

371. **anguiformis**; sheaths snake-like, simple, decumbent, tapering to one extremity; striæ distant. (TAB. CCXLIX.)

CV. OSCILLATORIA.

372. **littoralis**; stratum vivid green; filaments thick, dark green, curved; striæ conspicuous, closely set. (TAB. CV. *A.*)

373. **subsalsa,** Ag.—Br. Fl. vol. ii. p. 376. (*Unknown to me.*)

374. **spiralis**; stratum membranaceous, dark green, not very lubricous; filaments slender, spirally twisted, densely interwoven. (Tab. CV. *B.*)

375. **nigroviridis**; stratum very dark; filaments pale green, with obtuse, curved apices; striæ distant, half the diameter of the filament. (Tab. CCLI. *A.*)

376. **subuliformis**; stratum æruginous-green; filaments bright green, subuliform; striæ distant $\frac{1}{2}$–$\frac{3}{4}$ the diameter of the filament. (Tab. CCLI. *B.*)

377. **insignis**; stratum blackish-brown; filaments brown, very thick, their apices obtuse, slightly oblique and ciliated; striæ very close. (Tab. CCLI. *C.*)

CVI. SPIRULINA.

378. **tenuissima**; stratum very lubricous, æruginous; filaments densely spiral, very slender, flexuous. (Tab. CV. *C.*)

379. **Hutchinsiæ**, Kütz. (*Unknown to me.*)

Order 18. NOSTOCHACEÆ.

CVII. MONORMIA.

380. **intricata.** (Tab. CCLVI.)

CVIII. SPHÆROZYGA.

381. **Carmichaelii**; spores oblong, twice or thrice as long as broad, next the connecting cell. (Tab. CXIII. *A.*)

382. **Thwaitesii**; spores elliptical, once and a half as long as broad, distant from the ciliated connecting cell. (Tab. CXIII. *B.*)

383. **Broomei**; spores numerous, elliptical, twice as long as wide, commencing nearest the connecting cells, which are smooth and subquadrate. (Tab. CLXXIII. *A.*)

384. **Berkeleyana**; spores large, twice the width of ordinary cells, oblong, half as long again as wide, brown when mature, two on each side the connecting cell, which is spheroidal. (Tab. CLXXIII. *B.*)

385. **Ralfsii**, Thw.—Harv. Man. ed. 2. p. 233. (*Not figured.*)

CIX. SPERMOSIRA.

386. **litorea**; filaments nearly straight; cells very short, compressed, closely packed; spores elliptical, not wider than the cells. (Tab. CXIII. *C.*)

387. **Harveyana**; filaments much curved, composed of cells nearly as long as broad; spores exactly spherical, almost twice the diameter of the cells; connecting cells subquadrate, rather longer than wide, and of the same width as the ordinary cells. (Tab. CLXXIII. *C.*)

Order 19. PALMELLACEÆ.

CX. HORMOSPORA.

388. **ramosa**; branched; endochrome radiated. (Tab. CCXIII.)

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Gracilaria compressa	186	205
confervoides	187	65
erecta	188	177
multipartita	185	15
Grateloupia filicina	190	100
Griffithsia barbata	242	281
corallina	244	214
Devoniensis	243	16
equisetifolia	240	67
secundiflora	245	185
setacea	246	184
simplicifilum	241	287
Gymnogongrus Griffithsiæ	204	108
plicatus	205	288
Halidrys siliquosa	3	66
Haliseris polypodioides	33	19
Halymenia ligulata	209	112
Hapalidium Phyllactidium	162	166
Hildenbrandtia rubra	161	250
Himanthalia lorea	16	78
Hormospora ramosa	388	213
Hypnea purpurascens	189	116
Iridæa edulis	213	97
Jania corniculata	151	234
rubens	150	252
Kallymenia Dubyi	212	123
reniformis	211	13
Laminaria bulbosa	25	241
digitata	24	223
Fascia	29	45
longicruris	26	339
Phyllitis	28	192
saccharina	27	289
Laurencia cæspitosa	136	286

	Syn.	Plate.
Laurencia dasyphylla	138	152
obtusa	137	148
pinnatifida	135	55
tenuissima	139	198
Leathesia Berkeleyi......	57	176
tuberiformis ...	56	324
Lithocystis Allmanni	162	166
Litosiphon Laminariæ ...	50	295
pusillus	49	270
Lyngbya Carmichaelii ...	367	186
Cutleriæ	370	336
ferruginea	366	311
flacca	369	300
majuscula	365	62
speciosa	368	186
Melobesia agariciformis ..	155	73
calcarea	153	291
farinosa	158	347
fasciculata	154	74
lichenoides	156	346
membranacea ..	157	347
polymorpha ...	152	345
pustulata	160	347
verrucata	159	347
Mesogloia Griffithsiana ..	54	318
vermicularis ...	53	31
virescens.	55	82
Microcladia glandulosa ...	225	29
Microcoleus anguiformis ..	371	249
Monormia intricata......	380	256
Myrionema clavatum	69	348
Leclancherii ..	67	41
punctiforme ..	68	41
strangulans ..	66	280
Myriotrichia clavæformis .	96	101
filiformis ...	97	156
Naccaria Wigghii	216	38
Nemaleon multifidum ...	218	36
purpureum ...	219	161
Nitophyllum Bonnemaisoni	171	23
Gmelini	172	235
Hilliæ	170	169
laceratum ..	173	267
punctatum ..	169	202
versicolor ...	174	9

	Syn.	Plate.
Ochlochæte Hystrix	329	226
Odonthalia dentata......	98	34
Oscillatoria insignis	377	251
littoralis	372	105
nigroviridis ..	375	251
spiralis	374	105
subsalsa	373	
subuliformis ..	376	251
Padina Pavonia	34	91
Peyssonelia Dubyi	203	71
Phyllophora Brodiæi	201	20
membranifolia	200	163
palmettoides .	202	310
rubens	199	131
Plocamium coccineum ...	175	44
Polyides rotundus	206	95
Polysiphonia affinis	123	303
atrorubescens	125	172
Brodiæi	118	195
byssoides ...	129	284
Carmichaeliana	116	319
elongata....	114	292
elongella ...	113	146
fastigiata ...	127	299
fibrata	109	208
fibrillosa ...	117	302
formosa	107	168
furcellata ...	126	7
Grevillii	115	
Griffithsiana .	112	228
nigrescens ..	122	277
obscura	120	102
parasitica ...	128	147
pulvinata ...	108	102
Richardsoni .	111	10
simulans....	121	278
spinulosa ...	110	320
stricta	107	
subulifera ..	124	227
urceolata ...	106	167
variegata ...	119	155
violacea	115	209
Porphyra laciniata	343	92
miniata	344*	
vulgaris	344	211

	Syn.	Plate.
Ptilota plumosa	223	80
sericea	224	191
Punctaria latifolia	43	8
plantaginea	44	128
tenuissima	45	248
Pycnophycus tuberculatus	9	89
Ralfsia verrucosa	58	98
Rhizoclonium Casparyi	315	354
riparium	314	238
Rhodomela lycopodioides	99	50
subfusca	100	264
Rhodymenia bifida	177	32
ciliata	181	127
cristata	180	307
jubata	182	175
laciniata	178	121
palmata	183	217
Palmetta	179	134
Rivularia applanata	352	
atra	351	239
nitida	353	68
plicata	350	315
Rytiphlæa complanata	103	170
fruticulosa	105	220
pinastroides	103	85
thuyoides	104	221
Sargassum bacciferum	2	109
vulgare	1	343
Schizosiphon Warreniæ	354	316
Schizothrix Cresswellii	355	160
Seirospora Griffithsiana	248	21
Spermosira Harveyana	387	173
litorea	386	113

	Syn.	Plate.
Sphacelaria cirrhosa	76	178
filicina	72	142
fusca	77	149
plumosa	75	87
racemosa	79	349
radicans	78	189
scoparia	74	37
Sertularia	73	143
Sphærococcus coronopifolius	184	61
Sphærozyga Berkeleyana	384	173
Broomei	383	173
Carmichaelii	381	113
Ralfsii	385	
Thwaitesii	382	113
Spirulina Hutchinsiæ	379	
tenuissima	378	105
Sporochnus pedunculatus	21	56
Spyridia filamentosa	239	46
Striaria attenuata	42	25
Stenogramme interrupta	176	157
Stilophora Lyngbyæi	40	237
rhizodes	39	70
Taonia atomaria	37	1
Ulva Lactuca	341	243
latissima	340	171
Linza	342	39
Vaucheria marina	287	350
submarina	286	350
velutina	288	321
Wrangelia multifida	247	27
Zonaria collaris	35	359
parvula	36	341

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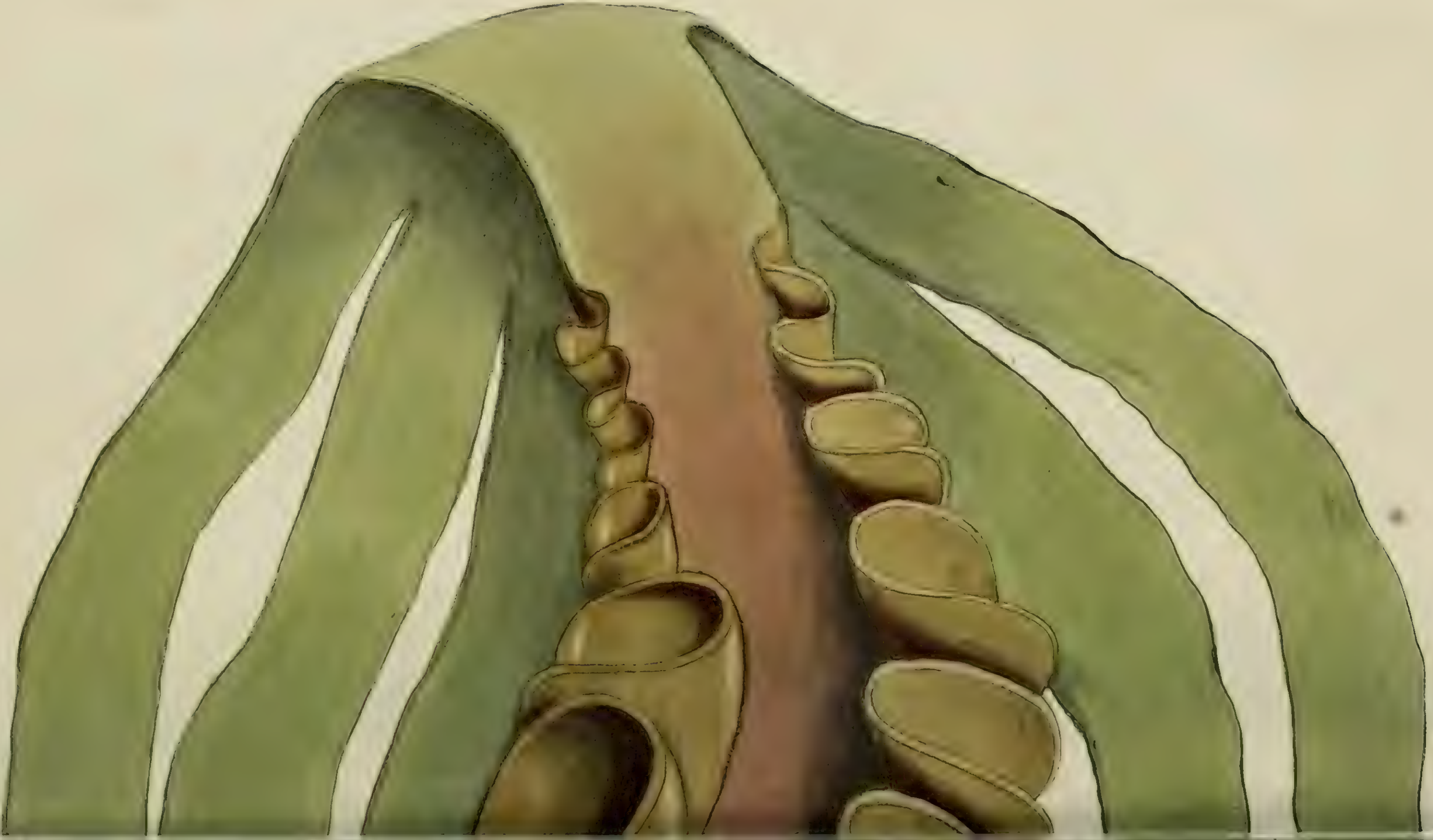
Plate CCXLI.



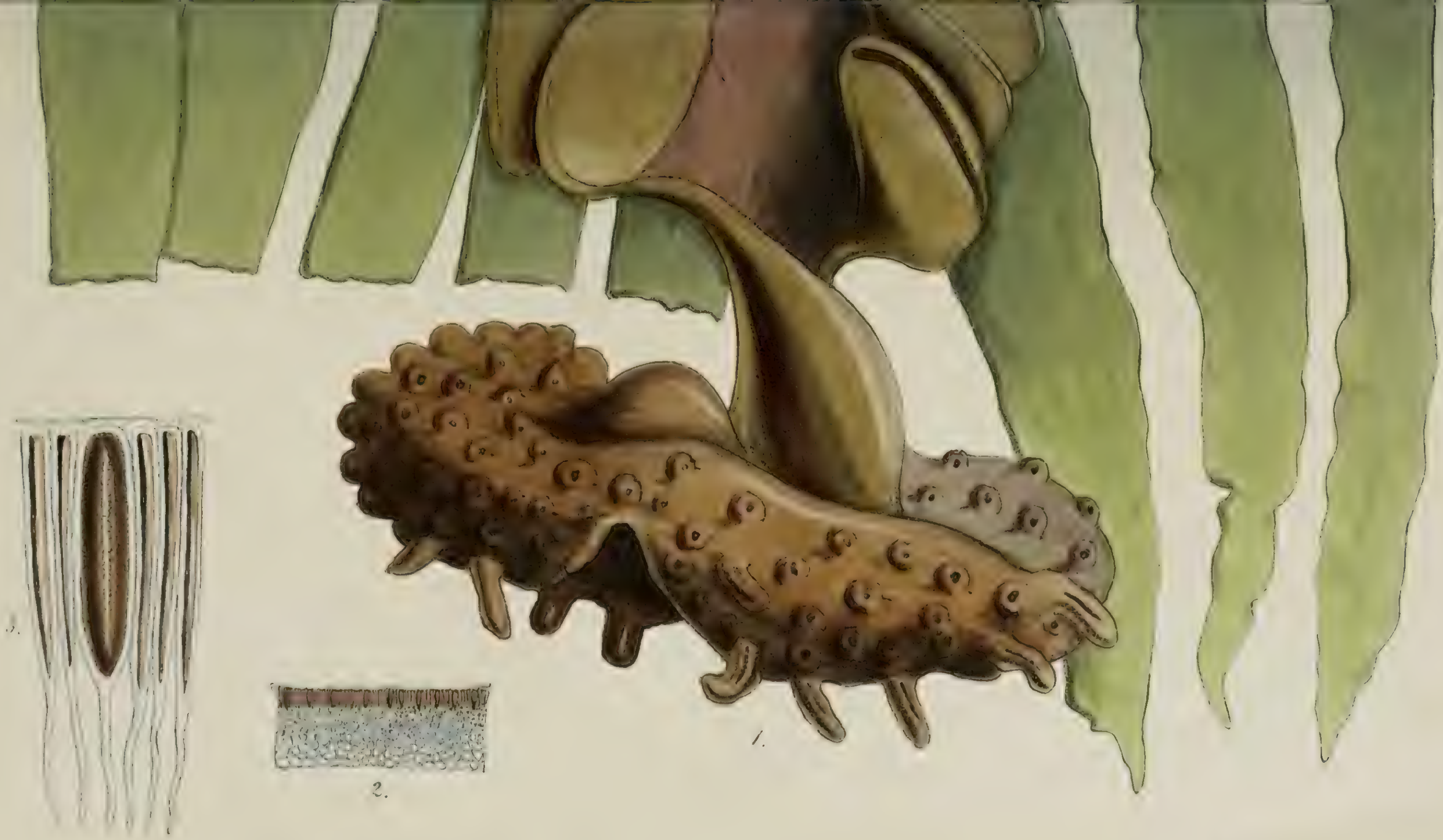


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PLATE CCXLI.

LAMINARIA BULBOSA, *Lamour.*

GEN. CHAR. *Frond* stipitate, coriaceous or membranaceous, flat, undivided or irregularly cleft, ribless. *Fructification*; cloudy spots of spores, imbedded in the thickened surface of some part of the frond. LAMINARIA (*Lamour.*),—from *lamina*, a thin plate, in allusion to the flat frond.

LAMINARIA *bulbosa*; stem flat, with a waved margin, once twisted at the base, rising from a roundish, hollow, warted tuber; frond oblong, deeply cleft into many linear segments.

LAMINARIA bulbosa, *Lamour. Ess.* p. 22. *Ag. Syn.* p. 18. *Lyngb. Hyd. Dan.* p. 21. *Hook. Fl. Scot.* part 2. p. 99. *Ag. Syst.* p. 271. *Ag. Sp. Alg.* vol. i. p. 114. *Grev. Alg. Brit.* p. 29. *Hook. Br. Fl.* vol. ii. p. 271. *Harv. in Mack. Fl. Hib.* part 3. p. 171. *Harv. Man.* p. 24. *Wyatt, Alg. Danm.* no. 4.

LAMINARIA Belvisii, *Ag. Sp. Alg.* vol. i. p. 115. *Ag. Syst.* p. 271.

SACCORHIZA bulbosa, *De la Pyl. Fl. Ter. Neuv.* p. 23. *J. Ag. Sp. Alg.* vol. i. p. 137.

HALIGENIA bulbosa, *Dne. Ess.* p. 50. *Endl.* 3*rd. Suppl.* p. 27.

PHYCOCASTANUM bulbosum, *Kütz. Phyc. Gen.* p. 346.

FUCUS bulbosus, *Huds. Fl. Angl.* p. 579. *Linn. Trans.* vol. iii. p. 153. *Turn. Syn.* p. 212. *Esper, Ic.* t. 123. *E. Bot.* t. 1760. *Turn. Hist.* t. 161.

FUCUS polyschides, *Lightf. Fl. Scot.* p. 936. *With.* vol. iv. p. 97. *Stack. Ner. Brit.* t. 4.

FUCUS palmatus, *Gmel.* t. 30.

ULVA bulbosa, *DC. Fl. Fr.* vol. ii. p. 16.

HAB. On rocks at low-water mark, and to the depth of 10–15 fathoms. Perennial. Autumn. Abundant on the British shores.

GEOGR. DISTR. Shores of Europe from Norway to Spain. Ferroe Islands. Coast of Guinea, *Pal. de Beauvois.*

DESCR. *Root*, in the young state of the plant, composed of several clasping fibres, gradually perishing as the frond increases in size, and its place supplied by a hollow tuber which originates at a higher point on the stem. *Stem* at first slender and filiform, half a line in diameter and an inch in height, with a small dilatation like a collar a little above its middle; gradually becoming broader and quite flat, till, in large specimens, it is four or five feet long, and two or three inches wide, with the margin very much waved and curled. In these full-grown specimens, the *collar*-like swelling becomes dilated into a hollow tuber, from four inches to a foot in diameter, rough with wart-like or cylindrical fibrous projections. The portion of the stem below the tuber is either absorbed or perishes, and roots issue from the lower surface of the tuber to supply the place of the original holdfast: thus a new base is provided for the frond. *Frond* in young specimens membranaceous, oblong, or ovate, undivided; when full-grown coriaceous, thick, from three to six feet in length, oblong, cloven into innumerable narrow, ribbon-like segments. *Spores* abundantly formed in the wavy margin of the stem, but not confined to this portion of the frond. They originate in the cells immediately beneath the surface, and are closely packed together, vertically, in large cloud-like sori; they are at first linear-clavate, at length elliptical; their perispore drawn out at base into a slender stipe. *Colour* a clear, brown olive; greenish when young. *Substance* more tender than in *L. digitata.*

This is the largest British species of the *Laminarieæ*, its frond in some instances forming, when spread out on the ground, a circle twelve feet in diameter. Its common name is *Furbelows*, and its aspect must be familiar to most visitors of the sea-shore.

In modern systems it is generally separated from *Laminaria*, and no less than three generic names have recently been proposed for it, of which *Saccorhiza*, having the priority in publication, has been adopted by Prof. J. Agardh in his recent work. *L. bulbosa* differs somewhat, in habit, from other *Laminariæ*, and may perhaps be allowed to form a separate generic group; but the chief diagnostic character insisted on by the upholders of the change is not valid. It is asserted that the spores are confined to the frill of the stem. It is quite true that here they are most abundant; but they also occur in effused patches on the lamina, as in other *Laminarieæ*.

I am indebted to my friend John Nuttall, Esq., of Titoor, for the specimen here figured, which is singularly characteristic of the full-grown plant, and yet of so small a size as to come easily into a quarto plate.

Fig. 1. LAMINARIA BULBOSA; a small, but fully formed specimen:—*of the natural size.* 2. Section, with spores, *in situ*:—*magnified.* 3. Spores, of various ages:—*highly magnified.*

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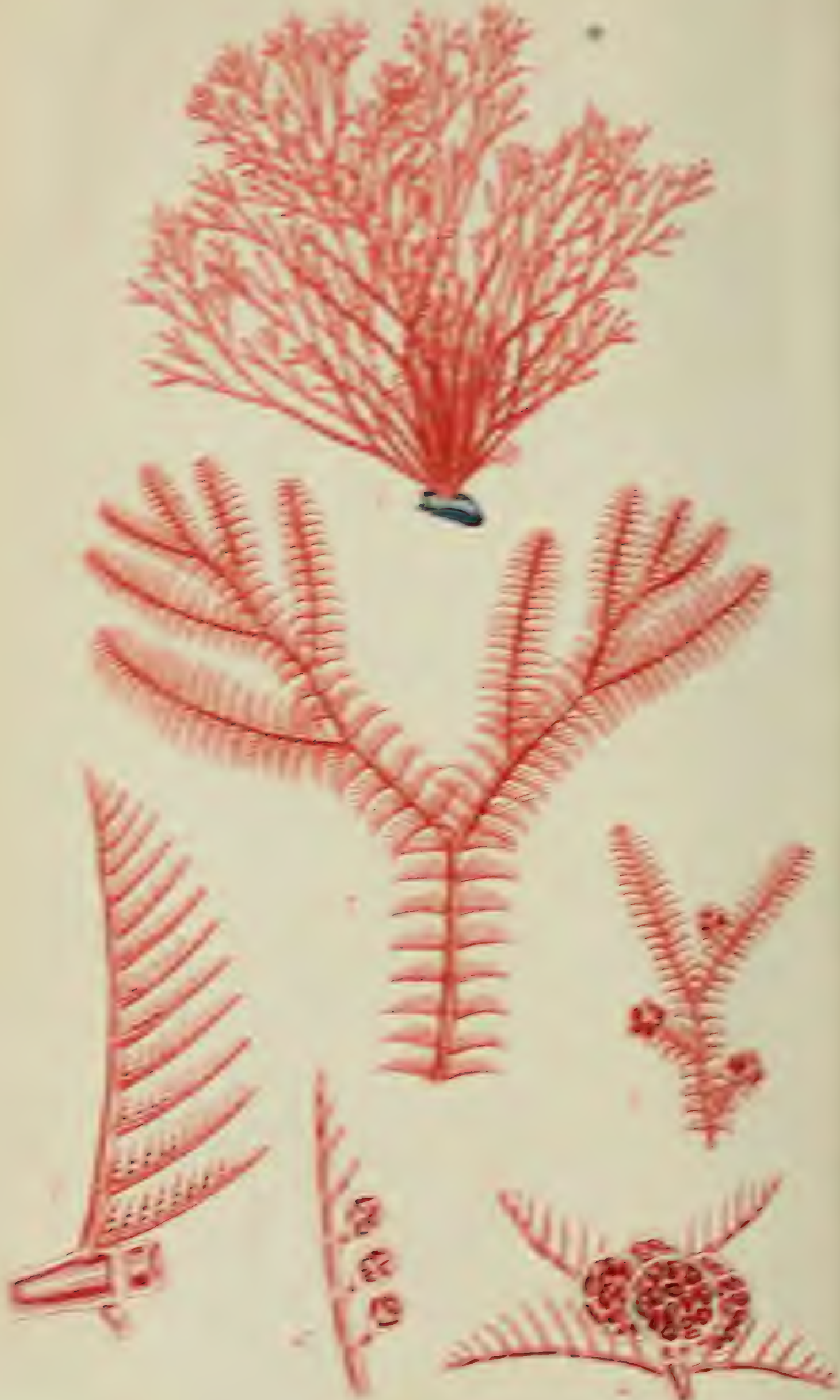

PLATE CCXLII.

CALLITHAMNION PLUMULA, *Lyngb.*

GEN. CHAR. *Frond* rosy or brownish red, filamentous, stem either opake and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular): dissepiments hyaline. *Fruit* of two kinds, on distinct plants; 1, external *tetraspores*, scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like *receptacles* (*favellæ*) seated on the main branches, and containing numerous, angular spores. CALLITHAMNION (*Lyngb.*),—from καλος, *beautiful*, and θαμνιον, a *little shrub*.

CALLITHAMNION *Plumula*; stems distichously branched, subdichotomous, articulated; each articulation bearing a pair of short, recurved plumules, pectinated on their upper margin.

CALLITHAMNION Plumula, *Lyngb. Hyd. Dan.* p. 127. *Ag. Sp. Alg.* vol. ii. p. 159. *Harv. in Hook. Br. Fl.* vol. ii. p. 339. *Harv. in Mack. Fl. Hib.* part 3, p. 213. *Harv. Man.* p. 104. *Wyatt, Alg. Danm.* no. 138. *Endl. 3rd Suppl.* p. 34. *Hook. fil. Fl. Antarct.* vol. ii. p. 489. *J. Ag. Alg. Medit.* p. 71. *Kütz, Phyc. Gen.* p. 372.

CERAMIUM Plumula, *Ag. Syn.* p. 62. *Ag. Syst.* p. 142.

CONFERVA Plumula, *Ellis, Phil. Trans.* p. 57. t. 18. *Dillw.* t. 50.

CONFERVA Turneri, *Sm. E. Bot.* t. 1637 (*not* 2339).

HAB. On rocks and Algæ, near low-water mark, and in 4–15 fathoms water. Annual. Summer. Not uncommon, from Orkney to Cornwall.

GEOGR. DISTR. Atlantic shores of Europe and North America. Mediterranean Sea. Cape Horn, *Dr. Hooker*. Tasmania, *Gunn*.

DESCR. *Root*, a small disc. *Fronds* densely tufted, from two to six inches in length, capillary, flaccid, distichously branched, the branches alternate or subdichotomous, repeatedly divided. The stems are articulated to the base, and every articulation, of the main stems as well as of the branches and their divisions, bears a pair of opposite, minute ramuli or *plumules*, inserted a short way below the apex of the articulation, and very much more slender than the part from which they spring. In luxuriant specimens *four* plumules instead of two, are frequently found. These plumules are from half a line to a line in length, spreading horizontally or somewhat reflexed, and pectinated, or bi-tripectinated along their upper faces; the ramuli of the combs standing at an angle of 45° with the rachis. Every articulation of the rachis bears its ramulus, with great regularity. The *tetraspores* are borne on the tips of the ultimate ramuli; they are therefore pedicellate. The *favellæ* are densely clustered, and terminate the main branches, which are there always shortened. The *colour* is a fine carmine, sometimes brownish; and is well preserved in drying. The substance is soft and tender, and the plant closely adheres to paper.

A very charming plant, though a common one; common, not merely on the shores of Europe, but dispersed far and wide through the ocean, north and south of the Line. Dr. Hooker gathered it at Cape Horn, and Mr. Gunn has sent it from Van Dieman's Land. I have examined specimens from these distant habitats, and compared them with those from our own shore, and can detect no specific distinctions. The characters of the species are indeed strongly marked, and once seen, cannot be forgotten. Would that others of this beautiful genus were equally constant! It would save botanists a world of trouble and uncertainty. Here every articulation, without exception, through the whole plant, bears its pair of comb-like branchlets. Under the microscope, therefore, *Cal. Plumula* cannot well be mistaken. But, notwithstanding this perfect regularity of branching, specimens differ much in luxuriance, and consequently in outer aspect; and we might enumerate *two* varieties, in one of which the combs are twice as long as in the other, and more delicate.

Cal. simile of the Antarctic Flora, a native of Kerguelen's Land, is an instance of a closely allied, and yet perfectly distinct species, and shows in a very forcible manner how similar two things in nature may be, without being the same; how closely she can draw her lines without touching at any point!

Fig. 1. CALLITHAMNION PLUMULA :—*of the natural size.* 2. Portion of a frond. 3. Portion of another specimen, with *favellæ.* 4. *Favellæ,* with surrounding plumules. 5. Plumule, bearing *tetraspores* on its ultimate ramuli. 6. Penultimate ramulus from the same, with tetraspores :—*all more or less highly magnified.*

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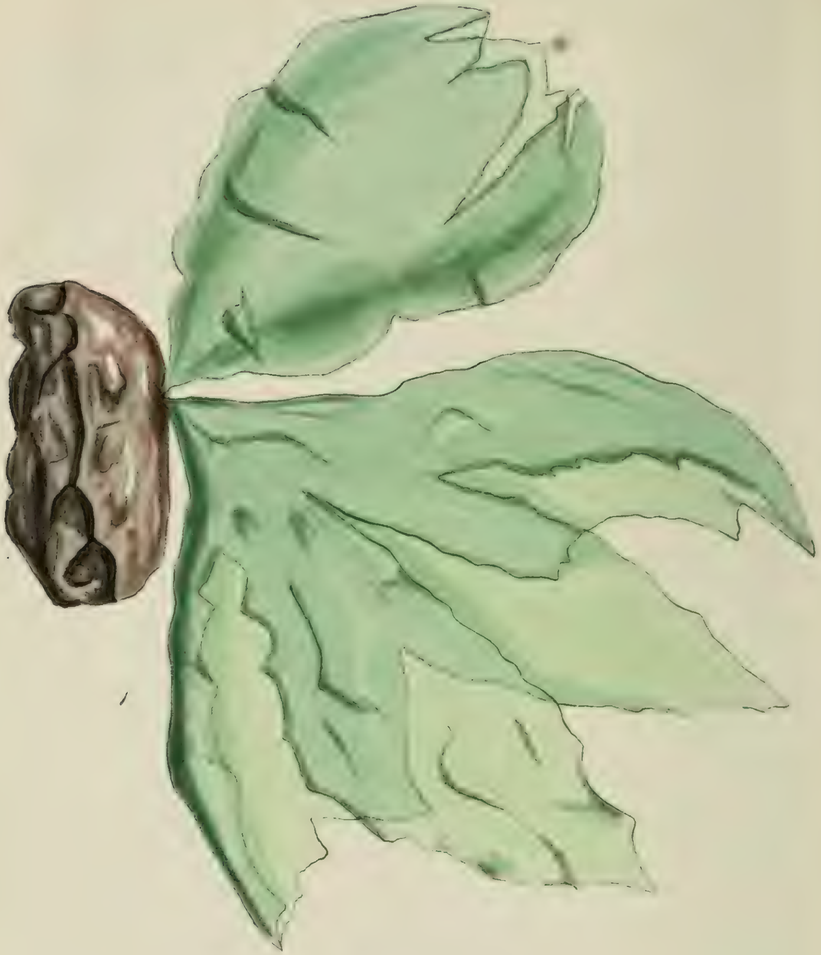
Plate CCXLIII



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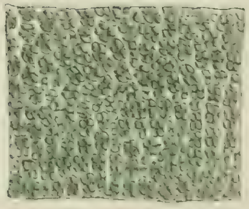

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Plate CCXLIII.

ULVA LACTUCA, *Linn.*

Gen. Char. *Frond* membranaceous, green, expanded, plane, (in some cases saccate when young,) composed of irregular cellules. *Fructification; granules,* often arranged in fours, scattered over the whole frond. Ulva (*L.*),—supposed to be from Ul, *water* in Celtic.

Ulva *lactuca;* "frond at first obovate, saccate, inflated, at length cleft down to the base; the segments plane, unequal, laciniated, semitransparent." *Grev.*

Ulva lactuca, *Linn. Sp. Pl.* p. 1632. *Lightf. Fl. Scot.* p. 970. in part. *Ag. Sp. Alg.* vol. i. p. 409. *Ag. Syst.* p. 189. *Lyngb. Hyd. Dan.* p. 30. in part. *Grev. Crypt. Scot.* t. 313. *Grev. Alg. Brit.* p. 172. *Hook. Br. Fl.* vol. ii. p. 311. *Harv. Man.* p. 170.

Hab. On rocks, stones, shells, and the smaller algæ between tide-marks. Annual. May and June. Generally distributed round the British coasts, but less common than *U. latissima.*

Geogr. Distr. Shores of Europe.

Descr. *Fronds* tufted, from two to six inches high, at first forming an obovate bag, closed at the summit, but soon bursting, and split quite to the base into two or more segments which are often irregularly lobed or divided, the margin sometimes entire, but oftener jagged. *Substance* very thin and delicate, semi-transparent, closely adhering to paper in drying. *Colour,* a peculiarly beautiful light yellowish green. The surface glossy when dry. Under the microscope the frond is seen to consist of closely packed, quaternate cells, lying in a transparent membrane.

To Dr. Greville belongs the merit, as far as British naturalists are concerned, of having first clearly pointed out the characters by which this delicate plant may be distinguished from the more common *U. latissima,* and therefore I have thought it best to preserve the diagnosis given by that author in his Algæ Britannicæ. The characters are most obvious in an early stage of growth, when the present plant forms an obovate sac, not very unlike a greatly distended *Enteromorpha;* while *U. latissima* is at all periods of its growth a flat membrane. Other characters are found in the substance and colour. *U. lactuca* is of a brighter and yellower green, and more glossy when dry; and its substance is greatly more thin and delicate than that of *U. latissima*. The form of both plants is too variable to find a place among the distinctive characters. *U. latissima* is found at all seasons and on every shore; but *U. lactuca* is seldom seen except in spring or early summer.

Fig. 1. Ulva lactuca, young and old plant:—*the natural size*. 2. Small portion of the membrane:—*magnified.*

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Plate CCXLIV.

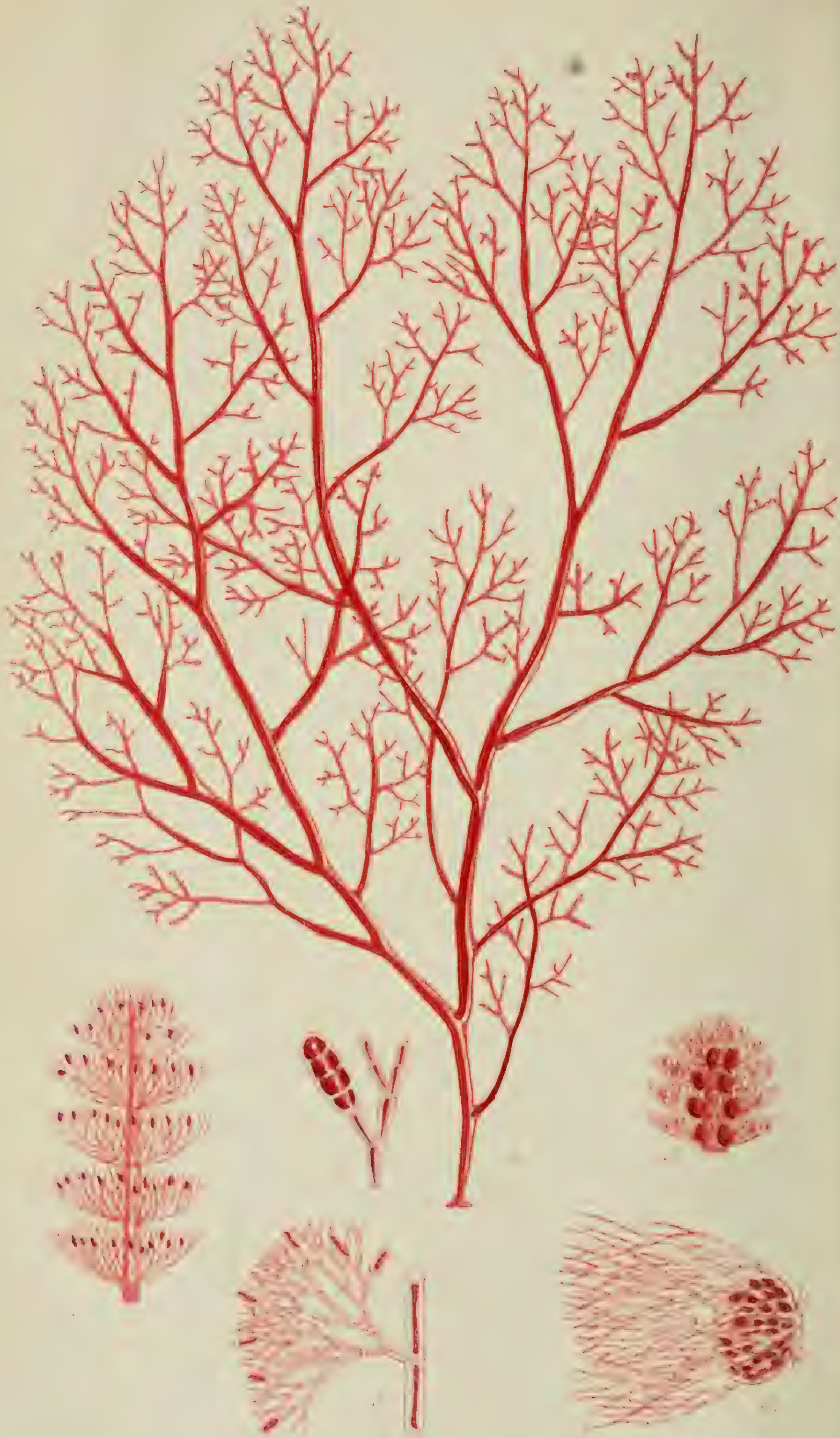

PLATE CCXLIV.

DUDRESNAIA COCCINEA, *Bonnem.*

GEN. CHAR. *Frond* cylindrical, gelatinous, elastic; *axis* composed of a lax net-work of anastomosing filaments, coated with a stratum of closely combined, longitudinal fibres; the *periphery* of horizontal, dichotomous, moniliform filaments. *Fructification,* of two kinds, on different individuals; 1, globular masses of *spores* (*favellidia*) attached to the filaments of the periphery. 2, external zoned *tetraspores,* borne on the filaments of the periphery, generally terminating a ramulus. DUDRESNAIA (*Bonnem.*),—in honour of *M. Dudresnay.*

DUDRESNAIA *coccinea;* frond rosy red, tender and gelatinous, much and irregulary branched; branches alternate, flexuous, moniliform, attenuated upwards; ramuli more or less numerous.

DUDRESNAIA coccinea, *Bonnem. in Journ. Phys.* vol. xciv. p. 180. *Crouan, Nouv. Ann. Sc. Nat.* vol. iii. p. 98. t. 2. f. 3–4. *J. Ag. Alg. Medit.* p. 84. *Endl. 3rd Suppl.* p. 37.

MESOGLOIA coccinea, *Ag. Syst.* p. 51. *Hook. Br. Fl.* vol. ii. p. 386. *Wyatt, Alg. Damn.* no. 148. *Harv. in Mack. Fl. Hib.* part 3, p. 186. *Harv. Man.* p. 48.

RIVULARIA verticillata, *E. Bot.* t. 2466.

HAB. On rocks &c., near low-water mark; or, more generally, in 4–10 fathom water. Annual. Summer. Very rare. Brighton, *Mr. Borrer.* Sidmouth and Torquay, *Mrs. Griffiths* and *Miss Cutler.* Salcombe, *Mrs. Wyatt.* Plymouth, *Rev. W. S. Hore.* Falmouth, *Miss Warren.* Jersey, *Miss White* and *Miss Turner.* Bantry Bay, *Miss Hutchins.*

GEOGR. DISTR. Atlantic coasts of France.

DESCR. *Root,* a very small, conical disc. *Fronds* from six to ten inches high, much branched and bushy: sometimes with a single stem closely set with lateral branches, sometimes divided near the base into several stems. *Stem* or its divisions, set with alternate, patent branches, the lowest of which are longest, the upper gradually shorter. These bear a second and a third, and in luxuriant specimens a fourth series of smaller branches and ramuli; each series being more and more slender, and the last about as thick as bristles. In some specimens the branches and ramuli are very dense, in others they are distant and bare. In the young frond the axis is a simple, articulated filament giving off at its joints whorls of dichotomous, moniliform ramuli; but as it advances in age the central filament or axis divides into several, or others grow round it, and the whorls are much more densely set. Thus in young plants the branches appear moniliform like those of a *Batrachospermum;* but in old plants they are cylindrical. *Favellidia* large, lodged at the base of dense, much divided ramuli. *Tetraspores* transversely four-parted, oblong, terminating the branches of the horizontal ramuli. *Colour*, a brilliant crimson, given out in fresh water. *Substance* gelatinous. The frond adhering closely to paper in drying.

One of the rarest of the British Algæ, scarcely known except on the southern shores of England, and there only in a few stations, and nowhere in great abundance. Perhaps one cause of its comparative rarity is its place of growth. Being a deep-water species it is rarely found except when cast ashore after a gale, or when sought by dredging. In the former case the specimens are frequently very flaccid, and faded in colour. I am not aware of its having been found in Ireland except, many years ago, by Miss Hutchins.

There is considerable difference in structure and also in appearance between young and old plants. In the former the axis is a simple, jointed filament, not very unlike that of a *Griffithsia*, whorled at short intervals with beaded fibres. But as the plant increases in age, the axis becomes more compound until it consists of a bundle of closely packed filaments; and then the branches become thicker and more cylindrical. *Favellidia* are commonly produced in abundance. *Tetraspores* are much more rare.

Fig. 1. DUDRESNAIA COCCINEA:—*of the natural size.* 2. Portion of a young branch, with tetraspores. 2. Ramulus from the same. 4. Tetraspores and portion of ramulus. 5. Portion of branch with favellæ. 6. Favella and ramuli from the same:—*all magnified.*

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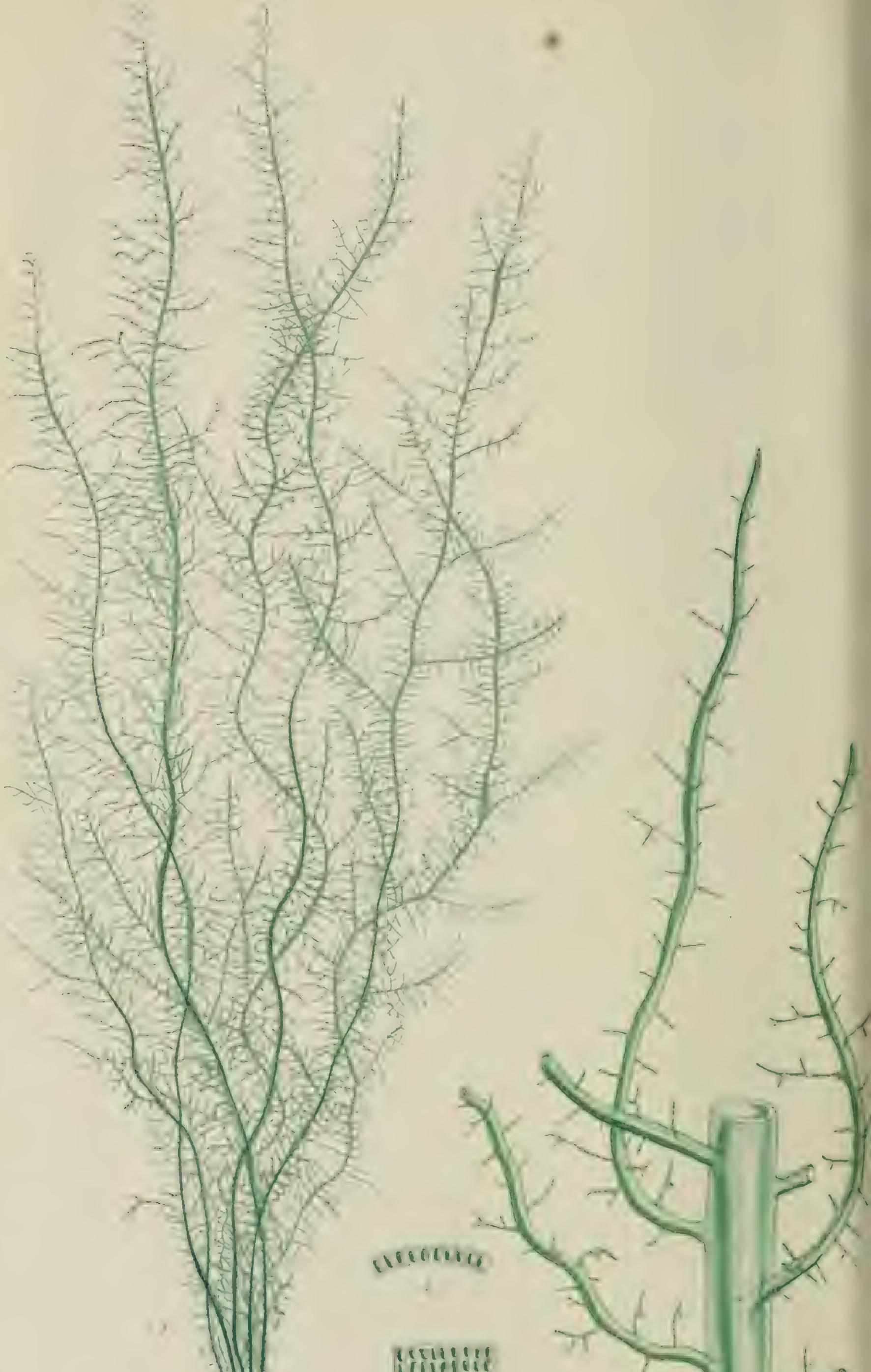

W.H.H. del. et lith.

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PLATE CCXLV.

ENTEROMORPHA RAMULOSA, *Hook.*

GEN. CHAR. *Frond* tubular, membranaceous, of a green colour, and reticulated structure. *Fructification;* granules, commonly in fours, contained in the cellules of the frond. ENTEROMORPHA (*Link*),—from ἔντερον, an *entrail,* and μορφή, *form* or *appearance.*

ENTEROMORPHA *ramulosa;* frond subcompressed, highly reticulated, irregularly divided; the main divisions long, densely set with lateral branches; branches curved, curled or twisted, everywhere clothed with short, spine-like ramuli.

ENTEROMORPHA ramulosa, *Hook. Br. Fl.* vol. ii. p. 315. *Harv. Man.* p. 175. *Wyatt, Alg. Damn.* no. 208.

ENTEROMORPHA clathrata, γ. uncinata, *Grev. Alg. Brit.* p. 181.

ULVA ramulosa, *E. Bot.* t. 2137.

ULVA uncinata, *Mohr. Cat. Alg.* fide *Ag.*

HAB. Rocks and stones, between tide-marks. Annual. Spring.

GEOGR. DISTR. Shores of Europe.

DESCR. *Fronds* from six inches to one or two feet in length, densely tufted, and often woven together into an inextricable mat, irregularly branched. Main stems frequently undivided or but slightly divided, furnished throughout with densely set, short, horizontal branches of very unequal length, some of them being not half an inch and others two or three inches long. These branches bear an abundance of short, spine-like, simple or slightly branched, scattered, setaceous or capillary ramuli, very much more slender than the part from which they spring. The stem and branches all taper to a fine point. The colour is an intense grass-green, of much brilliancy, and well preserved in drying. The substance membranaceous, rather harsh to the touch from the abundance of short spreading ramuli that cover the branches. In drying the frond adheres, but not very closely, to paper.

A common *form* of *Enteromorpha,* but scarcely more than a form. Under Plate XLIII. of our first volume I have stated that I regard *E. ramulosa* as merely one of the varieties of *E. clathrata,* and that both the plants so called have so much in common with *E. erecta* and others of the genus, that it is doubtful whether all are not merely varieties of one Protean species. To this opinion I still adhere. Nevertheless, as the extreme states described by botanists are outwardly dissimilar, I have determined to figure them all.

The present variety is distinguished by its squarrose habit, full green colour, and rather harsh feel. When young and untangled, as in our figure, it is not unsightly; but in age it often forms an inextricable fleecy mass, spreading widely over the surface of the ground, and forming a comfortable cover for a variety of small crustacea and shell-fish; but in this state it is not to be recommended to the seeker of specimens for the Herbarium.

Fig. 1. ENTEROMORPHA RAMULOSA:—*of the natural size.* 2. Portion of the stem with small branches and ramuli. 3. Fragment of the surface of the frond. 4. Part of tranverse section:—*magnified.*

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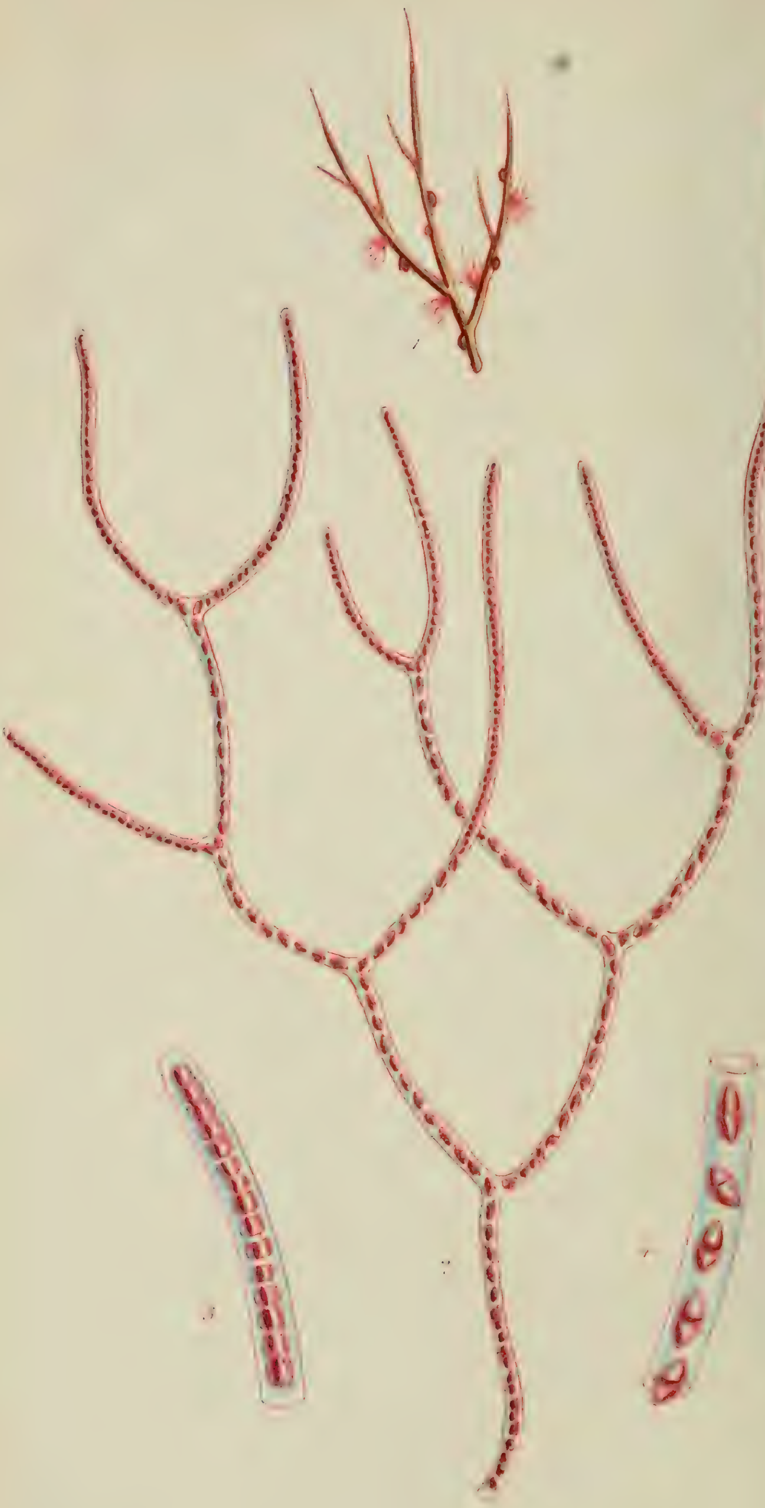

W.H.H. del et lith.

PLATE CCXLVI.

BANGIA (?) ELEGANS, *Chauv.*

GEN. CHAR. *Frond* filiform, tubular, composed (*in the typical species*) of numerous radiating cellules, disposed in transverse rows and enclosed within a hyaline, continuous sheath. *Spores* purple or green, formed within each of the cells of the frond. BANGIA (*Lyngb.),*—in honour of *H. Bang,* a Danish Botanist, and friend of Lyngbye.

BANGIA ? *elegans ;* filaments minute, dichotomously branched, with very patent axils; branches containing a single row of simple or binate, purple granular cells.

BANGIA elegans, *Chauv. Mem. Soc. Linn. Norm.* vol. vi. p. 13. *Alg. Norm. Fasc.* vii. no. 159. *Recherches,* p. 33.

HAB. Parasitical on the smaller algæ. Very rare. Dredged in Strangford Lough at Portaferry, adhering to *Gracilaria confervoides, Wm. Thompson, Esq.* (1838.)

GEOGR. DESCR. Coast of Normandy.

DISTR. Forming minute tufts, 1–2 lines long, resembling, to the naked eye, the tufts of *Callithamnion Daviesii* in colour and size. *Filaments* dichotomously branched, several times forked, the branches cylindrical, curved, spreading, with very wide axils, obtuse at the tips. The younger parts of the filament contain a string of closely-set lenticular granules or cells, arranged like those of a *Lyngbya.* In the older parts the cells are less regularly placed and are more distant, of a broadly spindle-like form with a division in the centre, as if composed of two conical or sugar-loaf bodies. These are probably the ripe *spores,* which escape on the bursting of the tubular filament. The colour of the spores is a purplish lake, becoming greenish in decay.

* * *

The only British specimen of this curious and beautiful little plant that I have seen, was dredged several years ago by my friend Mr. Thompson, of Belfast, who communicated it to me, and allowed me to retain a portion, from which the figure here given has been prepared. This I have compared with an authentic specimen of Chauvin's plant, received from M. Lenormand, and find them to agree in all essential particulars. The chief difference is in colour, the Irish specimen having lost its original purple and acquired a greenish shade; no uncommon effect of decay.

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The genus *Bangia* has long been a receptacle for heterogeneous species, and though partially reformed by M. Chauvin in the excellent memoir above quoted, it can hardly be said that in making the present plant a species of *Bangia* he has more than indicated its near affinities. For though doubtless *allied* to *Bangia,* its structure is more simple than in the genuine members of the genus, and it stands nearer perhaps to *Sphæroplea* of Agardh. It might, however, be more properly regarded as the type of a new genus characterized by the binate spores.

Fig. 1. Tufts of Bangia elegans, growing on Gracilaria confervoides:—*the natural size.* 2. A frond, *magnified.* 3. A young apex. 4. A portion of the older part of the frond:—*highly magnified.*

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Plate CCXLVII

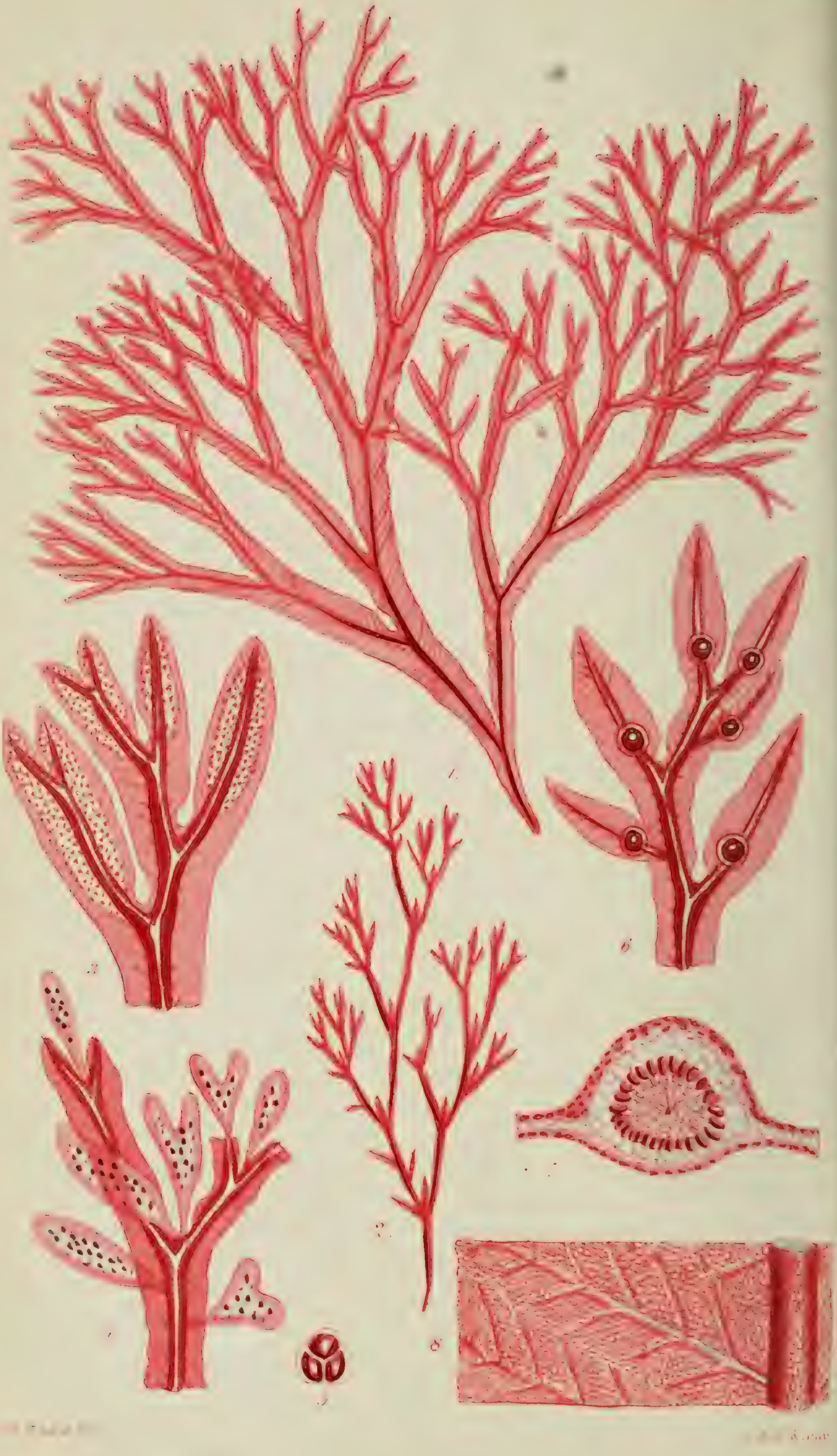

PLATE CCXLVII.

DELESSERIA ALATA, *Lamour.*

GEN. CHAR. *Frond* rose-red, flat, membranaceous, with a percurrent midrib. *Fructification* of two kinds, on distinct individuals; 1, spherical *tubercles* (*coccidia*) immersed in the frond, and containing a globular tuft of angular spores; 2, *tetraspores,* forming defined spots in the frond, or in leaf-like processes. DELESSERIA (*Lamour.*),—in honour of Baron B. Delessert, a distinguished botanist and patron of Botany.

DELESSERIA *alata ;* stem dichotomous, much branched, winged throughout with a narrow, membranous lamina which is pennate-nerved; tubercles rising from the midrib; tetraspores in sori occupying the apices of the frond, or in proliferous leaflets.

DELESSERIA alata, *Lamour. Ess.* p. 124. *Lyngb. Hyd. Dan.* p. 8. t. 2. *Ag. Sp. Alg.* vol. i. 178. *Ag. Syst.* p. 250. *Hook. Fl. Scot.* part 2. p. 100. *Grev. Fl. Edin.* p. 293. *Grev. Alg. Brit.* p. 73. *Hook. Brit. Fl.* vol. ii. p. 285. *Wyatt. Alg. Damn.* No. 14. *Harv. in Mack. Fl. Hib.* part 3. p. 191. *Harv. Man.* p. 55.

WORMSKIOLDIA alata, *Spreng. Syst. Veg.* vol. iv. p. 293.

HYPOGLOSSUM alatum, *Kütz. Phyc. Gen.* p. 445.

FUCUS alatus, *Huds. Fl. Ang.* p. 578. *Gmel. Hist.* p. 187. t. 25. f. 1. *Linn. Mant.* p. 135. *Syst. Nat.* p. 718. *Lightf. Fl. Scot.* p. 951. *Fl. Dan.* t. 352. *Stack. Ner. Brit.* t. 13. *Esper. Ic. Fuc.* vol. i. p. 20. t. 3. *Turn. Syn.* p. 144. *Turn. Hist.* t. 160. *E. Bot.* t. 1837.

HAB. On rocks and the larger Algæ, between tide-marks and in 4–10 fathoms water. All round the British Coasts.

GEOGR. DISTR. Atlantic shores of Europe and North America.

DESCR. *Root,* a small disc. *Frond,* 4–8 inches high, 1–4 lines in breadth, very much branched in a more or less regularly dichotomous manner; the main divisions being frequently alternate, or almost pinnately disposed, the minor ones regularly and repeatedly forked. *Branches* gradually narrower to the tips, consisting of a strong percurrent midrib or stem bordered with a flat, wing-like lamina, which follows all the divisions, but is usually broader at one side of the rib than at the other, especially toward the axils, where there is a deep, rounded sinus. This is most obvious on broad varieties. Every part of the membrane is furnished with opposite, patent veinlets connecting the midrib with the margin of the lamina, and themselves connected by pellucid striæ. Normally the frond is perfectly distichous, all the branches extending in one plane; but old specimens are very frequently beset with crowded, irregularly inserted branchlets, issuing from all parts of the midrib proliferously; such plants are excessively bushy. *Tubercles* immersed in the midrib, towards the tips of the branches, very convex. *Tetraspores* either contained in terminal sori, disposed at each side of the rib; or else in proper leaflets, irregularly grouped about the apices. *Colour*, in well grown specimens, a clear, deep crimson, varying to dark full red, and sometimes brownish. *Substance* membranaceous, adhering to paper. The cells of the frond are small and close, for the genus.

One of our commonest species; and though not without beauty, yet one of the least attractive of the genus to which it belongs. When well grown, with a broad wing to the stems, as in the specimen selected for our upper figure, its claims to the possession of considerable beauty and grace will readily be admitted, but in average specimens the wing-like margin is much more narrow and is very liable to injury; the colour darker and more dingy; and the ramification less regularly dichotomous. Sometimes, from proliferous growth, the whole upper part of the frond is thick and bushy.

Under Pl. LXXXIII. of the first volume will be found a statement of my views respecting the claims of *D. angustissima* to specific rank,—claims, which I did not then admit, and which I am not now disposed to do. That supposed species I can only regard as a very narrow and aberrant form of the present plant, having either no membrane developed, or a very imperfect one. Were it true that no membrane was ever found in *D. angustissima*, then we should have an *absolute* character on which to found a species. But such is not the case, for I have specimens in which the commencement of membrane is evident on some of the branches, while other parts, equally perfect, are destitute of membrane. I consider *D. angustissima* therefore to be an extreme variety of *D. alata*, analogous to the narrow states of such plants as *Chondrus crispus*.

Fig. 1. Delesseria alata; A broad variety. 2. Narrow variety:—*both the nat. size.* 3. Apex of branch with tetraspores. 4. Apex with the same, contained in proper leaflets. 5. A tetraspore. 6. Apex with tubercles. 7. Section of a tubercle. 8. Portion of the lamina and midrib:—*magnified.*

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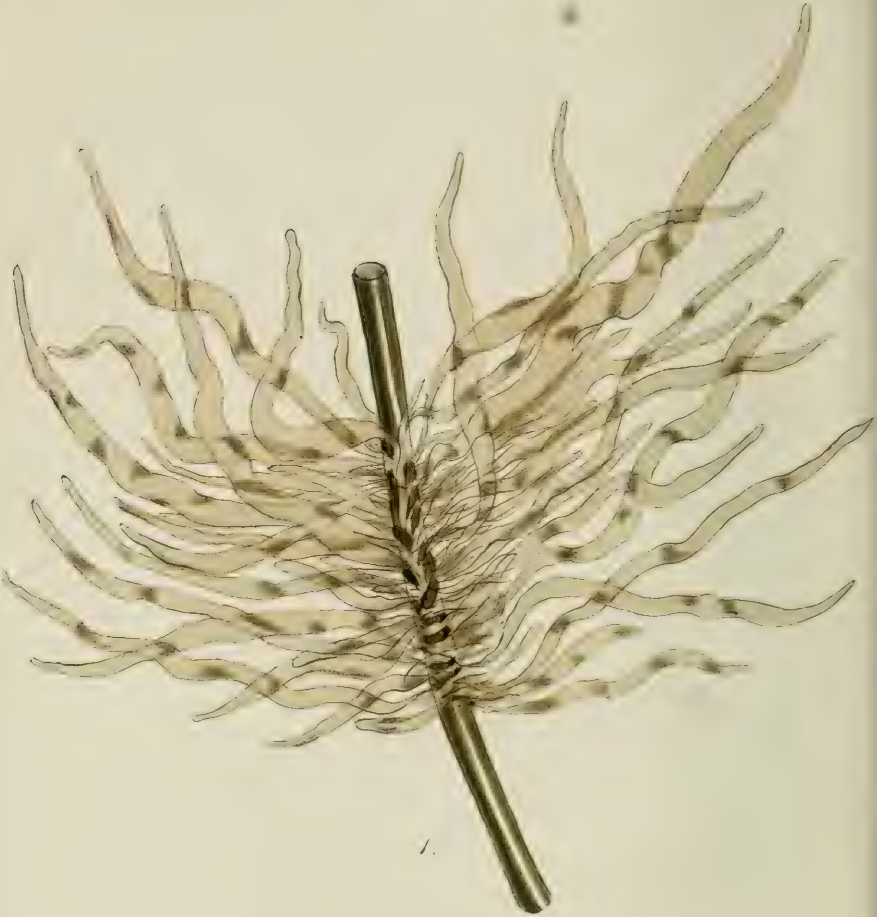
Plate CCXLV



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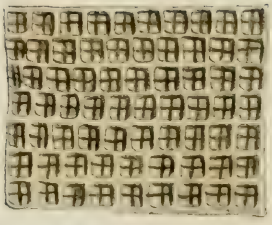

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W.H.H. del. et lith.

R.B.& R.imp

PLATE CCXLVIII.

PUNCTARIA TENUISSIMA, *Grev.*

GEN. CHAR. *Frond* undivided, membranaceous, flat, ribless, with a naked, scutate root. *Fructification* scattered over the whole frond, in minute, distinct dots, composed of roundish, prominent spores, intermixed with club-shaped filaments. PUNCTARIA (*Grev.*),—from *punctum*, a *dot;* the fruit being in dots, scattered over the surface.

PUNCTARIA *tenuissima;* frond sublinear, very thin, transparent. *Grev.*

PUNCTARIA tenuissima, *Grev. Alg. Brit.* p. 54. *Hook. Fl.* vol. ii. p. 279. *Harv. Man.* p. 34.

PUNCTARIA undulata, *J. Ag. Spec.* vol. i. p. 72.

ULVA plantaginifolia, *Lyngb.* p. 31. t. 6. (*fide J. Ag.*)

DIPLOSTROMIUM plantagineum, *Kg. Phyc. Gen.* p. 298.

HAB. Parasitical on *Zostera marina, Chorda filum,* &c. near low-water mark. Annual. Summer. Bute, *Dr. Greville.* Appin, *Captain Carmichael.* Near Dublin, *W.H.H.;* probably common.

GEOGR. DISTR. Atlantic Shores of Northern Europe, Baltic Sea. North West Coast of France. North America.

DESCR. *Fronds,* 2–8 inches long, 1–3 lines wide, very densely tufted, covering the plant on which they grow with innumerable slender wavy ribbons, tapering to the base and apex, but linear for the greater part of their length, sometimes ending bluntly; the margin waved or curled, and either entire, or remotely and irregularly toothed. *Colour,* a very pale shade of brownish olive, or horn-colour, sometimes hyaline. *Substance* exceedingly thin and delicate, adhering to paper. *Structure* beautifully areolated. *Fruit* unknown.

Two species of *Punctaria* have already appeared in this work, and the one now figured completes the representation of the British kinds. The present species has never been found in a state of fruit, and hence some botanists (among others my valued friend Mrs. Griffiths) regard it as the young of some other species; perhaps of *P. latifolia,* with which its substance more nearly agrees, than with that of *P. plantaginea.* But its great difference in form seems to forbid such an opinion being hastily adopted, particularly as young *P. latifolia* may be found of much smaller size and with a broader and more ovate frond. I rather think that this ignorance of the fruit arises from imperfect observation. The plant does not seem to be found all round the coast, and where it has been observed has been in places only occasionally and hastily visited by botanists; and though I have myself gathered it in my immediate neighbourhood, I must plead guilty to having neglected to watch its growth from the commencement to disappearance. Capt. Carmichael, a very close observer, was persuaded of its distinct character; and I have specimens from North America and the Baltic closely resembling those from our own shores.

According to the younger Agardh the synonyme *Zonaria tenuissima*, Ag., quoted by Greville belongs rather to *Laminaria fascia;* for which reason the Swedish Algologist has substituted the name *undulata* for that here adopted.

Fig. 1. PUNCTARIA TENUISSIMA; growing on *Chorda filum*:—*natural size.*
2. Small portion of the membrane:—*magnified.*

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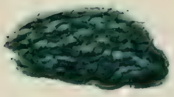

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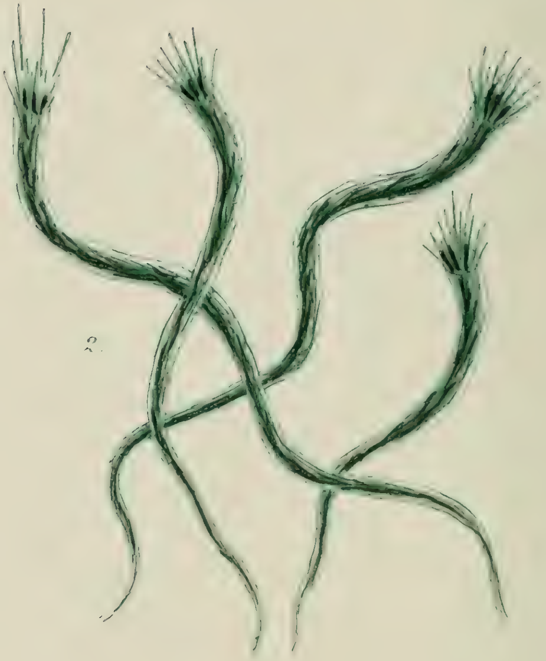

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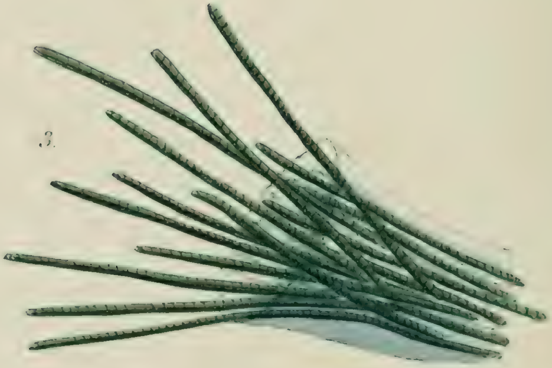

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PLATE CCXLIX.

MICROCOLEUS ANGUIFORMIS, *Harv.*

GEN. CHAR. *Filaments* minute, rigid, straight, transversely striate, bundled, and enclosed within membranaceous, simple or branching sheaths, from whose apices they oscillate. MICROCOLEUS (*Desmaz.*),— from *μικρος, small,* and *κολεος*, a *sheath.*

MICROCOLEUS *anguiformis;* sheaths snake-like, simple, decumbent, tapering much to the extremity; filaments slender, with distant striæ.

MICROCOLEUS anguiformis, *Harv. MSS. Hass. Fr. Water Alg.* p. 261. t. 70. fig. 1.

HAB. Pools of brackish water, near the shore, at Dolgelly, *Mr. Ralfs.*

GEOGR. DISTR. Coast of Wales.

DESCR. This minute plant forms a dense stratum of a dark green colour on the surface of the mud. The sheaths are grouped together without order, decumbent, much entangled, and variously twisted into many snake-like folds, broad at the extremity from which the filaments oscillate, and tapering much towards the other end. The inclosed filaments are short, slender, and straight, with distant striæ. The colour is a dull blackish green, without gloss when dry.

A minute but curious Alga, allied in many points to *Oscillatoria*, from which genus *Microcoleus* chiefly differs in possessing frond-like sheaths, containing threads bundled together. At first these sheaths appear scarcely more compound than a single filament, but as the plant advances, the sheath widens and is found full of a multitude of filaments. These oscillate, like those of an *Oscillatoria*, either from the wide mouth of the sheath, or from any accidental rupture which may happen in its side.

I am indebted to Mr. Ralfs for the only specimens I have seen of this plant, and am not aware of any habitat for it, save the one above recorded. It ought to occur in similar places, on other parts of the coast, but unless closely looked after may easily escape detection.

Fig. 1. Portion of the stratum :—*natural size*. 2. Sheaths, or fronds. 3. Apex of a sheath, with protruding filaments :—*both magnified*.

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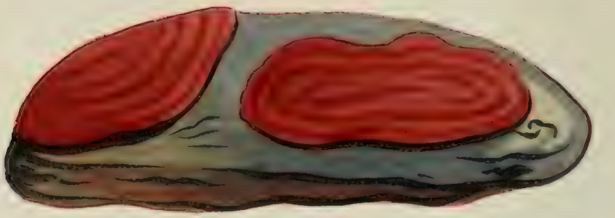
Plate CCL.



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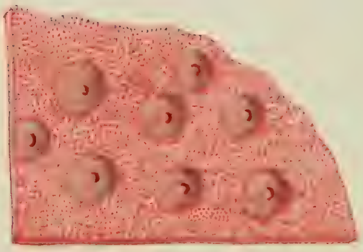

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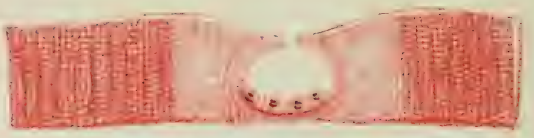

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PLATE CCL.

HILDENBRANDTIA RUBRA, *Meneg.*

GEN. CHAR. *Frond* cartilagineo-membranaceous, (*not stony,*) crustaceous, suborbicular, adhering by its lower surface; composed of very slender, closely packed, vertical filaments. *Conceptacles* immersed in the frond, orbicular, depressed, pierced by a hole and containing tetraspores and paraphyses at the base of the cavity. HILDENBRANDTIA (*Nardo*),—in honour of . . . . ?

HILDENBRANDTIA *rubra*, Meneg.

HILDENBRANDTIA rubra, *Meneg. Mem. Riun. Nat. Padov.* 1841, p. 10. *Endl. 3rd Suppl.* p. 26. (*excl. Syn. Berk.*) *Kütz. Phyc. Gen.* p. 384. t. 78. f. V.

HILDENBRANDTIA Nardi, *Zanard. Alg. Adr.* p. 135.

RHODODERMIS Drummondii, *Harv. in Ann. Nat. Hist.* vol. xiv. p. 27. pl. 2.

HAB. On smooth stones and pebbles, between tide-marks, as well as in deep water. At all seasons? Common on the shores of the British Islands.

GEOGR. DISTR. Atlantic and Mediterranean shores of Europe.

DESCR. *Frond* forming a thin, crustaceous expansion from half an inch to two inches or more in diameter, at first orbicular, and spreading in concentrically marked patches, but gradually sinuated and its surface irregularly corrugated as it advances in age; closely adhering by the whole of its under surface to the rock or stone on which it grows. A small portion viewed vertically with the microscope shows innumerable dot-like cells, imbedded in a clear, firm, gelatine: and thin slices, viewed laterally, prove the crust to be formed of very densely set, and closely cohering, slender filaments, composed of minute cells. When in fruit the surface is pitted with disc-like depressions, pierced in the centre by a hole which communicates with a chamber or immersed conceptacle hollowed out of the frond, and containing a few oblong, zoned tetraspores, among a number of paraphyses or abortive filaments. The part of the frond forming the walls of the conceptacle is of a much paler colour than the rest. *Colour* varies, according to locality, from a clear blood-red to a dark red brown. *Substance* coriaceo-membranaceous, very firm.

Common all round the coast, on stones and rocks within tide-marks, and also often dredged from deeper water. It forms a thin skin-like film, so closely applied to the surface of the body on which it grows that it is impossible to remove a specimen without laceration. Its colours are sometimes much brighter than at others, especially (as observed by Dr. Drummond) in places where it is exposed to the dripping of fresh water.

The affinity of this obscure plant is rather doubtful, and I am by no means satisfied with the position which I have now assigned to it, next the *Nullipores*. It differs from those vegetables in wanting the lime which forms so remarkable a portion of their solid contents; but its cellular structure is not very unlike that of a *Nullipore*, and there is a near resemblance in the fructification. The cells composing the frond in the *Nullipores* or *Melobesiæ*, are longer and narrower than those of the *Hildenbrandtia*, but arranged in an order nearly similar.

Kützing (Phyc. Gen. p. 384) makes three species; *H. sanguinea*, *H. rosea*, and *H. Nardi*, which to judge by the author's diagnoses, differ from each other merely in colour;—the first being "*ferrugineo-sanguinea*," the second "*coccineo-rosea*," and the third "*lutescenti-fusca, siccitate nigrescens.*" This last may possibly be our *Ralfsia*.

I am not acquainted with the writings of the botanist to whom this genus is dedicated.

Fig. 1. HILDENBRANDTIA RUBRA, on a stone:—*natural size*. 2. Portion of the frond, with disc-like depressions. 3. Section of the same, cut through a conceptacle. 4. Tetraspores:—*all magnified*.

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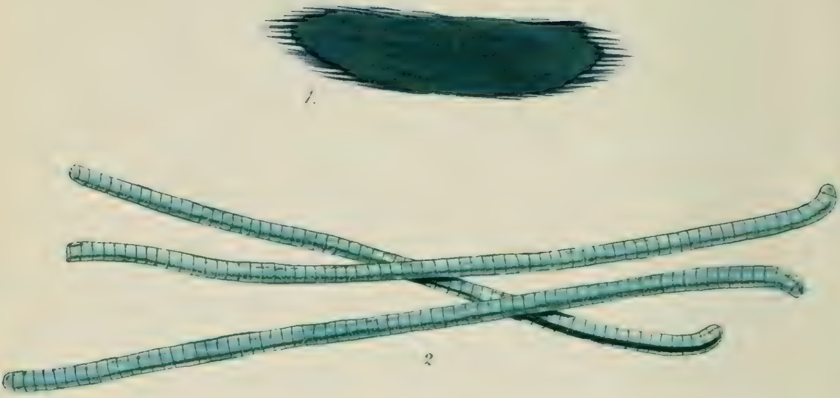

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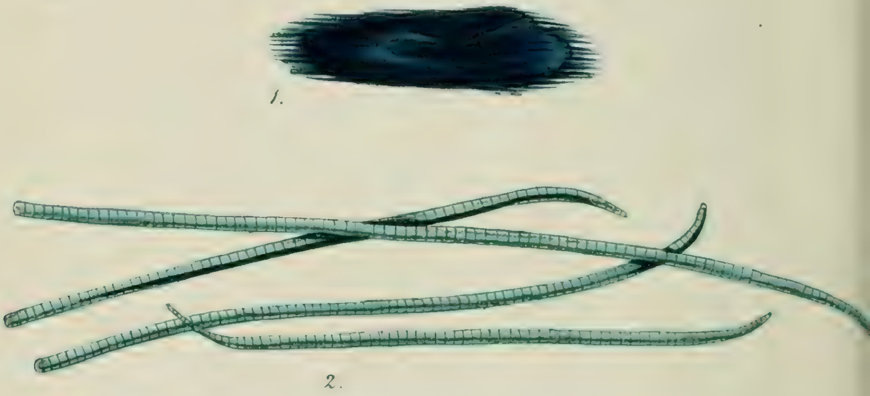

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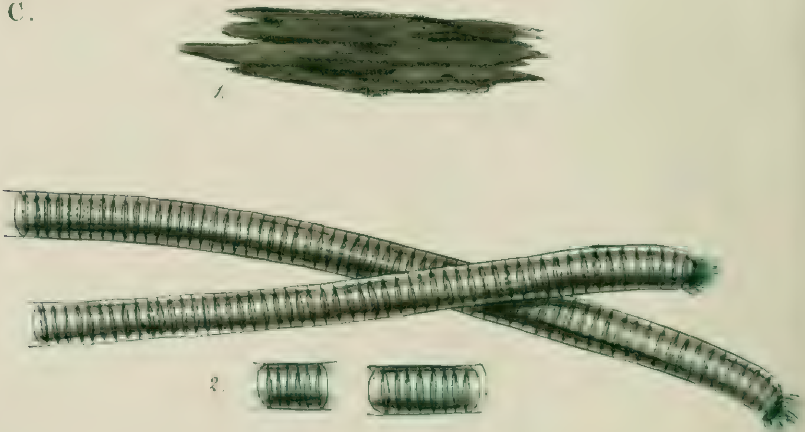

W.H.H. del. et lith.

R.B. & R. im

PLATE CCLI. *A.*

OSCILLATORIA NIGRO-VIRIDIS, *Thw. n. s.*

GEN. CHAR. *Filaments* lying in a mucous matrix, rigid, simple, vividly oscillating. *Tube* continuous. *Endochrome* annulated with more or less close, parallel, transverse striæ. *Oscillatoria* (Vaucher),—from the motion observed in the filaments.

OSCILLATORIA *nigro-viridis; stratum* of a very dark olive-green colour; *filaments* delicate, pale green, rigid, with obtuse, curved apices; *striæ* inconspicuous, distant about half a diameter of the filament; *endochrome* very slightly granulose.

HAB. In a brackish ditch at Shirehampton near Bristol. Aug. 1847, *G. H. K. Thwaites.*

DESCR. *Stratum* thin, of a dark olive green, almost black colour, growing upon the mud and subsequently floating in large masses. *Filaments* of a pale dull green colour, with obtuse, distinctly curved, scarcely attenuated apices. *Striæ* not conspicuous, distant from each other about half a diameter of the filament. *Endochrome* scarcely granulose.

* * *

This species, which I have met with only once, bears some resemblance, as has been remarked to me by the Rev. M. J. Berkeley, to *Oscillaria uncinata*, of *Kützing*, but the latter is a smaller species than ours, and has the striæ of its filaments more distinctly marked. *Thw.*

PLATE CCLI. *B.*

OSCILLATORIA *subuliformis; stratum* of an intense æruginous green colour; *filaments* bright green, subuliform; *striæ* inconspicuous, distant from one half to three quarters of a diameter of the filament; *endochrome* not evidently granulose.

HAB. In brackish ditches, at Shirehampton near Bristol, during the Summer and Autumn, not uncommon. *G. H. K. Thwaites.*

DESCR. *Stratum* thin, growing upon the mud, subsequently floating, appearing black in the water, but when taken out, of a beautiful deep blue-green colour. *Filaments* very delicate, bright green, gradually attenuated towards the apices, which are subacute and much curved. *Striæ* inconspicuous, distant from each other about three-fourths of a diameter of the filament. *Endochrome* uniform, not visibly granulose.

This beautiful species, the filaments of which oscillate very vividly, is an extremely interesting object under the microscope. The curved ends of the filaments may then be seen to move in a spiral direction, showing that this is the real motion of the filaments, though they may appear to an inattentive observer to have merely a waving lateral movement. Without the sanction and kind assistance of Mr. Berkeley, I should scarcely have ventured to describe this and the foregoing species as new, but he has kindly compared them with authentic specimens in his own herbarium, and considers them hitherto undescribed. *Thw.*

PLATE CCLI. *C.*

OSCILLATORIA *insignis; stratum* of a dark brown, almost black colour; *filaments* brown, of considerable diameter, their apices obtuse, slightly oblique, and ciliated. *Striæ* conspicuous, very close; *endochrome* distinctly granulose.

HAB. In a brackish ditch at Shirehampton near Bristol, in Nov. 1848. *G. H. K. Thwaites.*

DESCR. *Stratum* thin, covering decaying vegetable matter at the bottom of the ditch in which it occured, with a dark brown coating, becoming somewhat greenish in drying. *Filaments* very large, rather brittle; their apices rounded, somewhat oblique and furnished with numerous delicate motionless cilia. *Endochrome* distinctly granulose; the granules being principally evident close to the striæ, which they render more conspicuous.

The cilia which terminate the filaments of this fine species, are not peculiar to it alone. Professor Kützing has figured in his "Phycologia Generalis" similar appendages to the filaments of *Oscillaria subfusca*, and has noted their occurrence in another species. Careful observation shews that these cilia have no proper motion of their own, and therefore can exercise no agency on the movements of the filaments; they appear to be mere appendages, or terminations of the membranous tube, and to perform no important function in the economy of the plant. *Thw.*

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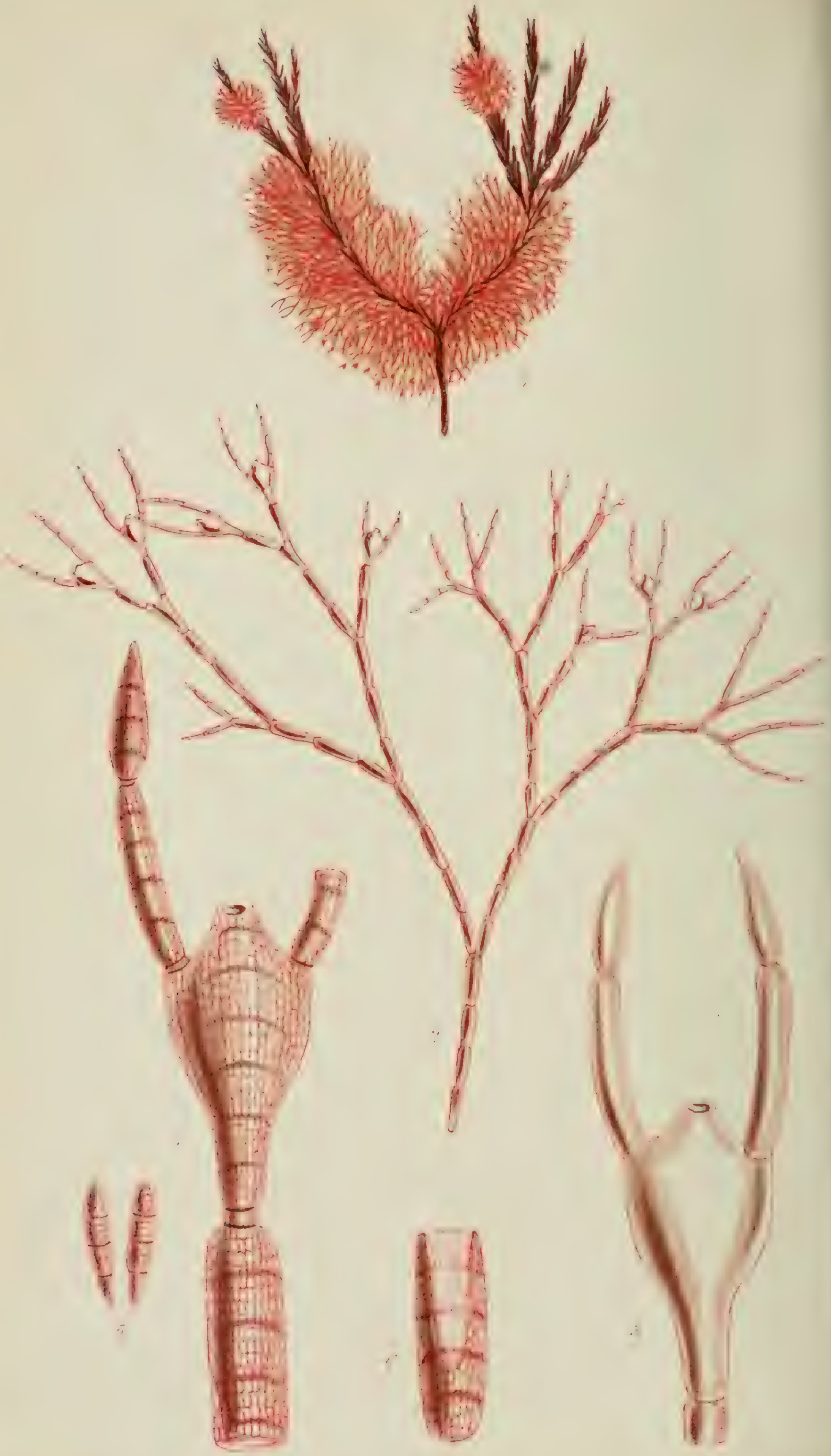
Plate CCLII.



W.H.H. del. et lith.

PLATE CCLII.

JANIA RUBENS, *Lamour.*

GEN. CHAR. *Frond* filiform, articulated, dichotomously branched, coated with a calcareous deposit. *Fructification,* urn-shaped *ceramidia* formed of the axillary articulation of the uppermost branches (mostly two horned), pierced at the apex by a minute pore, and containing a tuft of erect, pyriform, transversely parted *tetraspores.* JANIA,—(*Lamour*), from *Janira,* one of the *Nereides.*

JANIA *rubens;* articulations of the principal branches and ramuli cylindrical, about four times as long as broad.

JANIA rubens, *Lam. Cor. Flex.* p. 272. *Gray, Brit. Pl.* vol. i. p. 339. *Flem. Brit. An.* p. 514. *Johnst. Brit. Lith.* p. 224. *Dne. Ess.* p. 111. *Endl.* 3rd *Suppl.* p. 49. *Kütz. Phyc. Gen.* p. 389.

CORALLINA rubens, *Ellis and Soland. Zooph.* p. 123. *Turt. Brit. Faun.* p. 211. *Lam. An. s. Vert.* 2nd edit. vol. ii. p. 517.

HAB. Parasitical on the smaller Algæ, between tide-marks. Perennial. Summer. On all parts of the British Coast.

GEOGR. DISTR. Shores of Europe. South Africa.

DESCR. *Fronds* from half an inch to an inch and a half in height, densely tufted, dichotomous, many times forked, fastigiate; branches either erect or spreading, gradually attenuated toward the apices. *Articulations* cylindrical in all parts of the frond, without prominent angles; those near the base very short, the upper ones gradually longer; those in the middle parts of the frond from four to five times longer than broad. *Apical* articulations either acute or obtuse, sometimes much attenuated, and sometimes nearly as robust as in other parts of the frond. *Ceramidia* subterminal, urnshaped, with long horns formed of from two to four articulations. When deprived of its lime by acid, the frond is distantly banded with dark, transverse striæ. *Colour* a pale red, with purplish shades when quite fresh.

The commonest species of the genus Jania and the most widely diffused, abounding along the shores of Europe and having been brought also from the Southern Ocean. I have specimens from South Africa which nearly accord with those from our own coasts. It probably occurs on the American shore in equal abundance.

From *J. corniculata* (tab. nost. CCXXXIV.) which it outwardly much resembles, *J. rubens* may, at once, be known by the long, cylindrical lower articulations; and this much is generally sufficient to ascertain the species. But I observe, on some specimens, especially those from the South of England, an occasional prolongation of the upper angles of the articulation, showing a tendency to approach *J. corniculata*. Still, I have never seen a thoroughly intermediate specimen.

Several exotic species nearly resemble *J. rubens* in habit, differing chiefly in size and in the comparative length of the articulations.

Fig. 1. JANIA RUBENS, growing on *Cladostephus*:—*of the natural size.* 2. A branch. 3. Ceramidium. 4. The same, after maceration in acid. 5. Tetraspores. 6. An articulation, from which a transverse slice has been removed, showing the internal structure:—*all magnified.*

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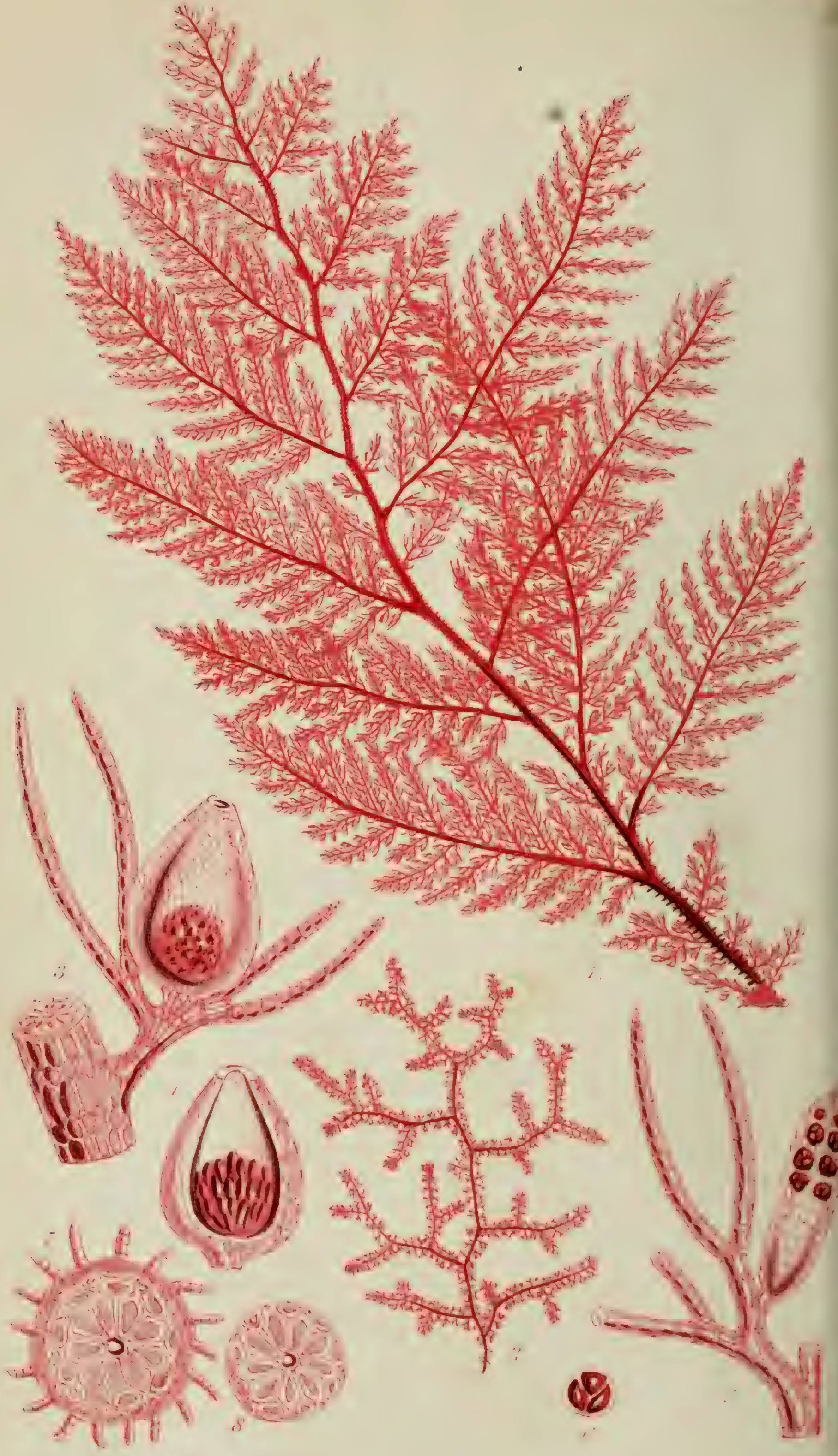

PLATE CCLIII.

DASYA COCCINEA, *Ag.*

GEN. CHAR. *Frond* filamentous; the stem and branches mostly opake, irregularly cellular (rarely pellucid and longitudinally tubed), composed internally of numerous parallel tubes surrounding a central cavity; the ramuli jointed, single tubed. *Fructification* two fold, on distinct plants: 1, ovate *capsules* (*ceramidia*) furnished with a terminal pore, and containing a tuft of pear-shaped spores; 2, lanceolate *pods* (*stichidia*) containing tetraspores ranged in transverse bands. DASYA (*Ag.*),—from δασυς, *hairy.*

DASYA *coccinea;* stems elongate, robust, rough with hair-like fibres, distichously branched; branches bi-tri-pinnate; pinnulæ multifid, single-tubed, their articulations as long as broad.

DASYA coccinea, *Ag. Spec. Alg.* vol. ii. p. 119. *Harv. in Hook. Br. Fl.* vol. ii. p. 335. *Wyatt, Alg. Damn. No.* 41. *Harv. in Mack. Fl. Hib.* part 3. p. 209. *Harv. Man.* p. 97. *Endl. 3rd Suppl.* p. 44.

ASPEROCAULON coccineum, *Grev. Fl. Ed.* p. 309.

ELLISIUS coccineus, *Gray, Br. Pl.* vol. i. p. 334.

TRICHOTHAMNION coccineum, *Kütz. Phyc. Gen.* p. 415.

HUTCHINSIA coccinea, *Ag. Syn.* p. 26. *Hook. Fl. Scot.* part 2. p. 89. *Ag. Syst.* p. 147.

CALLITHAMNION coccineum, *Lyngb. Hyd. Dan.* p. 124.

CONFERVA coccinea, *Huds. Fl. Ang.* p. 603. *With.* vol. iv. p. 141. *Dillw. Conf.* t. 36. *E. Bot.* t. 1055.

CONFERVA plumosa, *Ellis, Phil. Trans.* vol. lvii. p. 425. t. 18. f. *c. C. d. D. Lightf. Fl. Scot.* p. 996.

CERAMIUM hirsutum, *Roth, Cat. Bot.* vol. ii. p. 169. t. 4.

Var. β. *squarrosa;* branches destitute of hair-like fibres, sparingly and often irregularly branched; ramuli squarrose.

CERAMIUM patens, *Grev. Crypt. Scot.* t. 261.

HAB. On rocks and Algæ near low-water mark; β. dredged in deep-water. Annual. Summer. Common.

GEOGR. DISTR. Atlantic shores of Europe, from Norway to Spain.

DESCR. *Root,* a conical disc. *Stem,* six to eight inches long or more, mostly undivided, as thick as small cord at the base, gradually attenuated, opake, and clothed with short, shaggy hairs, pretty regularly tri-pinnate pinnæ long, spreading, lanceolate closely pinnulated; the ultimate pinnulæ forked or multifid, or cloven to the base into numerous simple, single-tubed ramuli. *Articulations* visible in the smaller branches only, many tubed, and very short, interrupted by transverse bands of small, irregular cells. A transverse section of the stem exhibits nine radiating siphons disposed round a small cavity, and surrounded by a band of small cells, of thickness varying according to the age of the part from which the section is made. Articulations of the ramuli very short. *Ceramidia* ovate, with thick walls. *Stichidia* oblong, suddenly mucronate, nearly sessile. *Colour*, a fine deep crimson, becoming brighter after immersion in fresh-water. β. is much smaller and more squarrose in its branching, sometimes nearly bare of ramuli.

A well-known plant, common along the coasts of Europe, and a great favourite with collectors of Sea-weeds for ornamental purposes.

I have mentioned but one variety, as worthy of note; but this variety puts on so many forms that it might be split into two or three. In Dr. Greville's figure (Crypt. Scot. t. 261,) the species appears in its most depauperated state, so different in aspect from the normal condition, that without an inspection of connecting links, it would be difficult to suppose the two forms belonged to one species. But by dredging in sandy bays and among *Nullipores* a complete series of forms, connecting the most luxuriant with the most lank, may be collected. Those from deep-water are generally very irregularly branched, and seldom produce fruit. Specimens having *stichidia* are always more slender and delicate than those that bear *ceramidia.*

Fig. 1. DASYA COCCINEA. 2. The var. *β. squarrosa :—both of the natural size.* 3. *Ceramidium* with accompanying ramuli. 4. Section of ceramidium. 5. Stichidium, with ramuli. 6. A tetraspore. 7. Section of lower part of the stem. 8. Section of a branch :—*all magnified.*

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Plate CCLIV

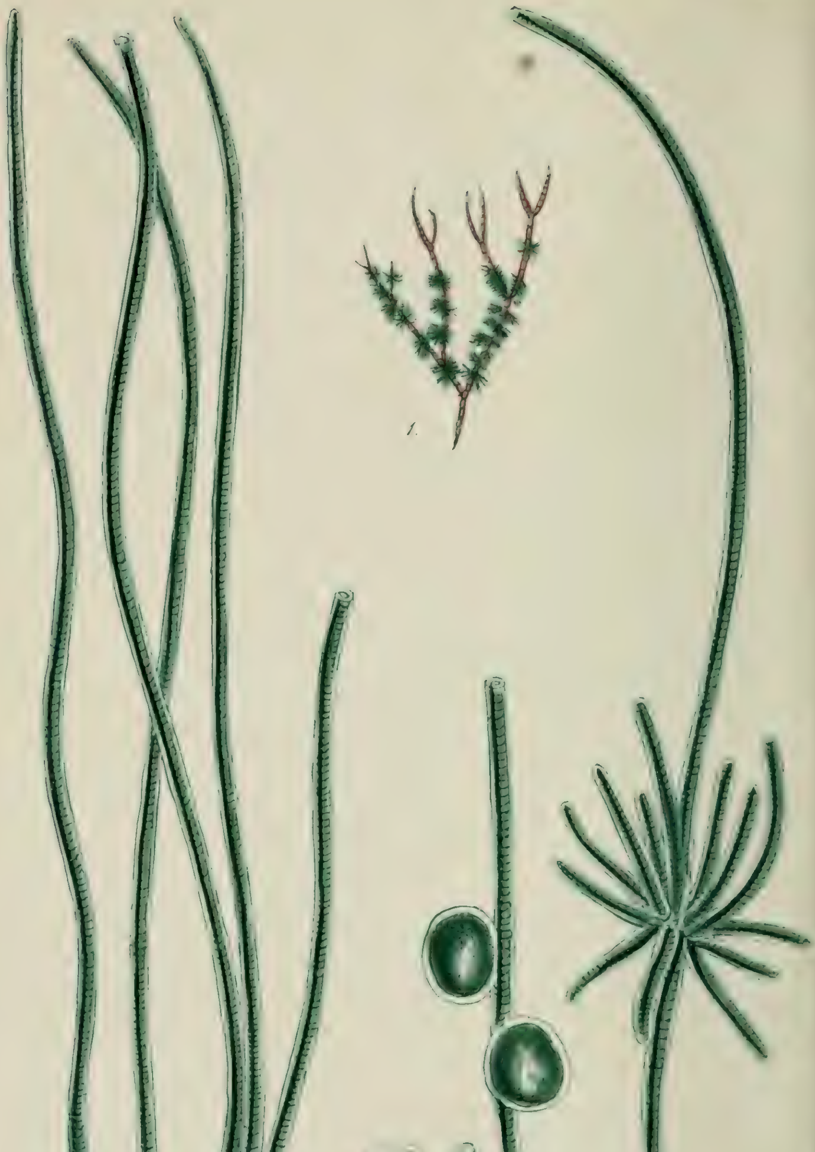

PLATE CCLIV.

CALOTHRIX CONFERVICOLA, *Ag.*

GEN. CHAR. *Filaments* destitute of mucous layer, erect, tufted, or aggregated, fixed at the base, somewhat rigid, not oscillating. *Tube* continuous; endochrome green, densely annulated, at length dissolving into lenticular sporidia. CALOTHRIX (*Ag.*),—from καλος, *beautiful,* and θριξ, *a hair.*

CALOTHRIX *confervicola;* filaments short, glaucous, opake, filiform, blunt, rigid, straight or slightly curved, tufted.

CALOTHRIX confervicola, *Ag. Syst.* p. 70. *Harv. in Hook. Br. Fl.* vol. ii. p. 367. *Harv. in Mack. Fl. Hib.* part 3. p. 237. *Harv. Man.* p. 156. *Wyatt, Alg. Damn. No.* 229.

LEIBLEINIA confervicola, *Endl. Gen. No.* 57. *3rd Suppl.* p. 21.

LEIBLEINIA purpurea, chalybea et æruginea? *Kütz. Phyc. Gen.* p. 221.

OSCILLATORIA confervicola, *Ag. Syn.* p. 110. *Lyngb. Hyd. Dan.* p. 94.

CONFERVA confervicola, *Dillw. Conf.* t. 8. *Roth, Cat. Bot.* vol. iii. p. 193. *Fl. Dan.* t. 1484. f. 1. *E. Bot.* t. 2576.

HAB. On small Algæ, between tide-marks; very common. Annual. Summer and autumn.

GEOGR. DISTR. Shores of Europe and North America.

DESCR. *Filaments* densely tufted, somewhat stellate, a line or two in length, filiform, slightly tapering upwards, straight or slightly curved, not twisted, rigid, free or slightly connected together by the edges towards the base, unbranched or sometimes throwing out from the centre of the filament a fascicle of short ramuli, seemingly a proliferous evolution of the endochrome. Now and then, but rarely, roundish bodies, resembling conceptacles (represented at fig. 3) are found attached to the sides of the filaments: their exact nature is not determined. *Endochrome* very dense, of a dark green-colour, reflecting glaucous tints from the surface, closely annulated.

Very abundant on the smaller algæ towards the end of summer, especially on *Ceramium rubrum,* whose fronds are sometimes completely hidden beneath the dense, dark-green pile, formed by this parasite. Such specimens have somewhat the habit of a *Cladostephus,* so densely and equally covered are they. Under water they reflect glaucous tints.

I have ventured to figure globular bodies, which I never saw but once, though I have repeatedly sought for them. They were originally noticed many years ago by Sir W. J. Hooker, and figured from his drawing, in one of the supplementary plates of Dillwyn's *Confervæ*, and on the faith of that figure the plant has been erected into a genus by Bory,—a measure sanctioned by Endlicher,—and placed in the neighbourhood of *Ectocarpus*. Whatever the nature of these bodies may be, I think that this little plant can scarcely be removed from its congeners without violence; and certainly am unwilling to admit a relationship to *Ectocarpus*. The spore-like bodies may be of the nature of buds, or excrescences, and may possibly be afterwards changed into the tufted ramuli, which are frequently found, as it were, bursting from the sides of the filament.

Fig. 1. CALOTHRIX CONFERVICOLA, growing on *Ceramium rubrum*:—*the natural size*. 2. Portion of a fascicle. 3. A proliferous filament; and portion of filament with supposed spores. 4. More highly magnified segment of filament:—*magnified.*

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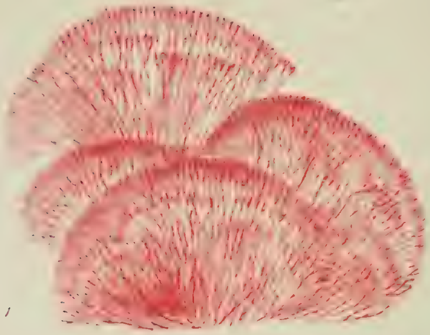
Plate CCLV



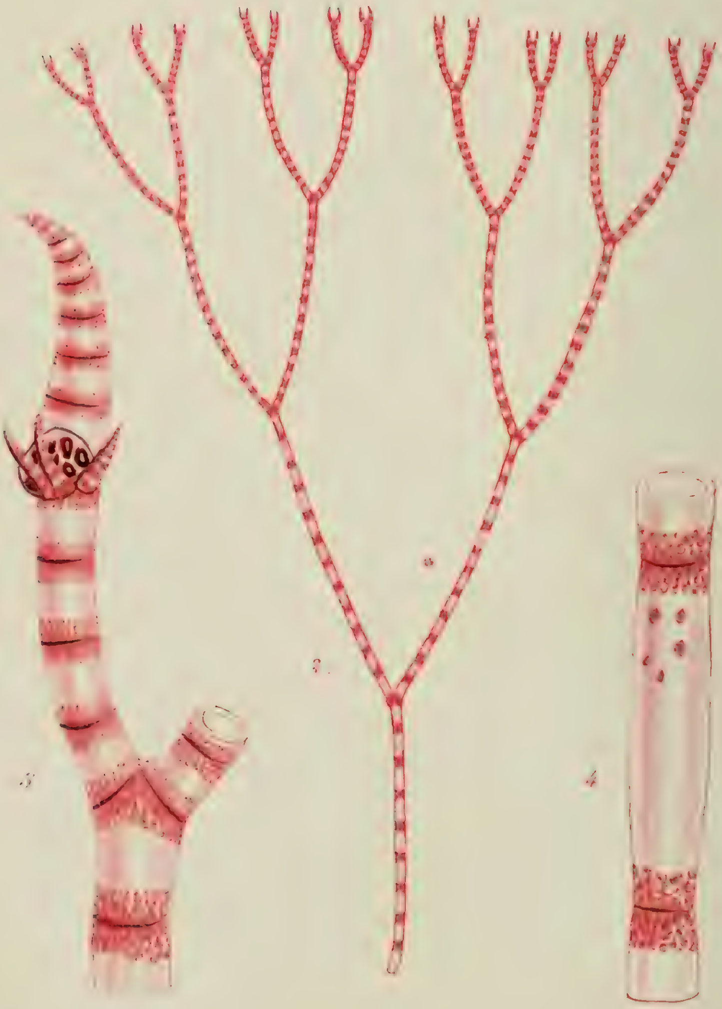


PLATE CCLV.

CERAMIUM FASTIGIATUM, *Harv.*

GEN. CHAR. *Frond* filiform, one-tubed, articulated; the dissepiments coated with a stratum of coloured cellules, which sometimes extend over the surface of the articulation. *Fructification* of two kinds on distinct individuals; 1, *tetraspores* either immersed in the ramuli or more or less external; 2, sessile, roundish *receptacles (favellæ)* having a pellucid limbus, containing minute, angular spores, and subtended by one or more short, involucral ramuli. CERAMIUM (*Roth*),—from κεραμος, a *pitcher*; but the fruit is *not* pitcher-shaped.

CERAMIUM *fastigiatum*; frond capillary, of equal diameter throughout, flaccid, dichotomous, level-topped; the axils acute; articulations pellucid, those of the middle of the stem from four to six times longer than broad, the upper gradually shorter, and coloured; dissepiments coated with coloured cells; favellæ small, subterminal, subtended by three or four involucral ramuli.

CERAMIUM fastigiatum, *Harv. in Hook. Lond. Journ. Bot.* vol. i. p. 303. *Wyatt, Alg. Danm.* no. 86. *Harv. Man.* 1st ed. p. 99.

GONGROCERAS fastigiatum, *Kg. in Linn.* xv. p. 736. *Phyc. Gen.*

HAB. On rocks, &c., near low-water mark; rare. Annual. Autumn and winter. Torquay, *Mrs. Griffiths*. Mt. Batten, Plymouth, *Rev. W. S. Hore*. Frith of Forth, *Dr. Greville*.

GEOGR. DISTR. Mediterranean Sea, *Kützing*. East coast of North America.

DESCR. *Filaments* 4–5 inches high, as thick as human hair, densely tufted, of equal diameter throughout, fastigiate, many times dichotomous, regularly forking from the base to the apex, mostly bare of lateral branchlets, but sometimes having a few, short, simple or forked ramuli. The lower axils distant, and somewhat spreading; the upper close together and narrow, acute. *Apices* generally emarginate, the points straight, or slightly curved, somewhat hooked, but not rolled inwards. Lower *articulations* from three to six times as long as broad, pellucid and colourless, furnished occasionally with a few scattered granules; upper articulations gradually shorter, the pellucid spaces suffused with pale, watery endochrome; the uppermost very short and strongly coloured. *Favellæ* of small size, sessile near the apex of the frond, having a few short, involucral ramuli. *Tetraspores* I have not seen. *Substance* tender, and flaccid, closely adhering to paper. *Colour*, in the tuft, a dark purple, fading in the herbarium to brick-dust colour; in the filament, a clear purplish lake.

* * *

This is one of the rarest and most beautiful of the British species of *Ceramium*. It is nearly related to *C. nodosum*, particularly in ramification, and in the diameter of its filaments; but the substance is much more soft and tender than in that species, and the colour much brighter. The upper joints, moreover, in the present species are suffused with a beautiful carmine, and the axils are far less patent. The tufts are perfectly fastigiate, forming regular circular fans when displayed on paper.

The merit of having first correctly distinguished the present plant is due to Mrs. Griffiths, who has for many years studied the species of the puzzling genus *Ceramium* with great care, and who is, therefore, more competent than most botanists to judge of the proper limits of the species. Whether this plant be the *Conferva fastigiata* of Roth (Cat. Bot., vol. ii. p. 224), I am unable to decide, having never seen an authentic specimen of that author's naming, but I suspect that half-a-dozen *Ceramia* which are now regarded as species, have been at different times referred to Roth's synonym. Our present plant is by no means confined to one locality. The specimens from the several stations above noted, are all of the same character, and I have also had the pleasure of receiving from my liberal correspondents, Professor Bailey of New York, and Mr. Olney of Rhode Island, U. S., North American specimens in all respects similar to our British ones.

Fig. 1. Tuft of CERAMIUM FASTIGIATUM :—*of the natural size.* 2. Portion of a filament :—*magnified.* 3. Apex of the same, with favella. 4. Articulation from the lower part of the same :—*both highly magnified.*

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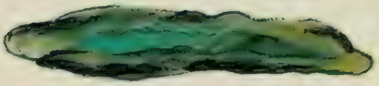

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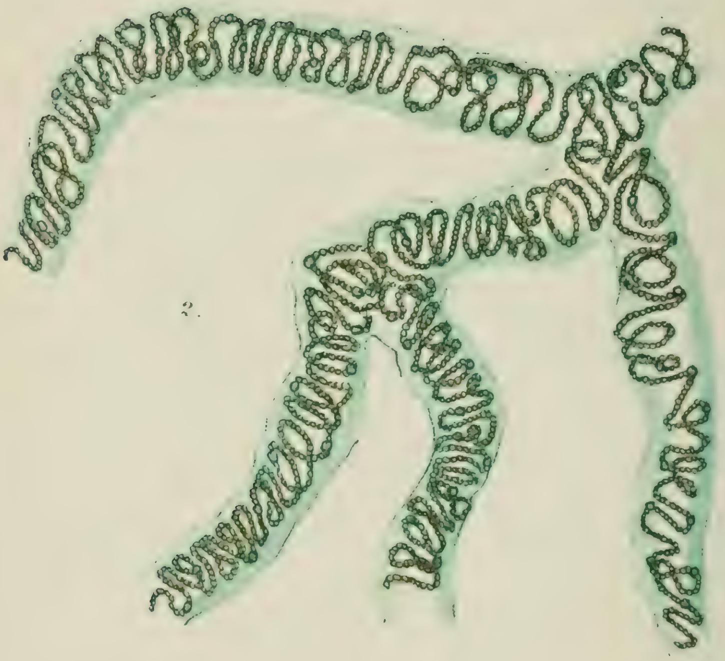

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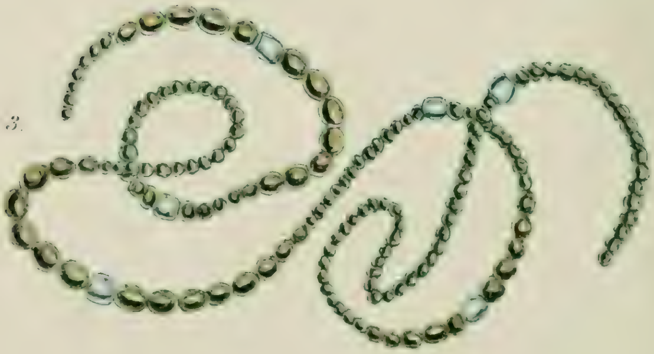

3.

W.H.H. del. et lith.

R.B.& R. imp

PLATE CCLVI.

MONORMIA INTRICATA, *Berk.*

GEN. CHAR. *Frond* gelatinous, branched; the branches containing a spiral moniliform filament, composed of spherical, coloured cells, interrupted here and there by a cell of a different kind, and of larger size. *Spores* formed from the ordinary cells. MONORMIA (*Berk.*),—from μονος, *one*, and ορμος, a *necklace*.

MONORMIA *intricata*.

MONORMIA intricata, *Berk. Gl. Brit. Alg.* p. 46. t. 18. *Harv. Man.* ed. 1. p. 185. *Hass. Brit. Fresh Water Algæ*, p. 285. pl. 75. f. 11.

HAB. At Gravesend, in the ditches of the marsh to the south of the Frindsbury canal, in great abundance, in June, 1832, *Rev. M. J. Berkeley*. Ditch (brackish) near Lighthouse, Shirehampton, Bristol, *Mr. G. H. K. Thwaites*.

GEOGR. DISTR. Not noticed out of England?

DESCR. "Forming small, roundish, gelatinous masses floating amongst different species of *Lemna* in fresh water, but probably within the influence of the tide; and also amongst *Enteromorpha intestinalis*, and even within its frond, in brackish water. The plant is at first of an olive yellow, gradually assuming a greener tint, and when dried, of a deep verdigris. Very gelatinous, delicately branched; the branches very flaccid. Under a high magnifier the whole plant is evidently composed of gelatine, in the centre of which runs a single moniliform filament following the ramifications, and in its progress curling to and fro repeatedly across the thread; the joints being nearly globular. The specimens from the interior of *Enteromorpha intestinalis* are paler, and have often longer joints amongst the globular ones."—*Berk.* In young specimens the moniliform thread is found composed of a string of spherical, olive-green cells, of equal size, here and there interrupted by a larger, subquadrate cell, much paler than the rest. As it advances in age the cells, nearest the quadrate cell enlarge, become ellipsoid, and filled with a dense endochrome; in fact, converted into spores. The process of change into spores goes on at each side of the quadrate cell (which remains unchanged), until the whole of the filament is turned into a string of spores. If these simply organized plants have sexes, the functions of the male probably reside in these quadrate cells.

This curious plant has but a slender claim for admission into this work, being commonly a fresh-water production; but the specimens here figured having been obtained from the same salt-water ditches which have already supplied us—through the kindness of Mr. Thwaites,—with several interesting subjects, I have thought that there could be no objection to giving a figure of a plant interesting by its structure and beauty, and so closely allied to the *Sphærozygæ*, which have already appeared. *Monormia* seems to differ from *Sphærozyga* chiefly in possessing a gelatinous branching matrix, so loose in structure that it can hardly be called a frond, surrounding the spirally-twisted filament. This filament is of indefinite length, having many connecting cells: the filaments of the *Sphærozygæ*, on the contrary, are generally short, with seldom more than one or two connecting cells. The fructification in both appears formed on the same type.

Fig. 1. Stratum of MONORMIA INTRICATA as it appears to the eye. 2. Part of a branching frond:—*magnified.* 3. Portion of the filament from the same:—*very highly magnified.*

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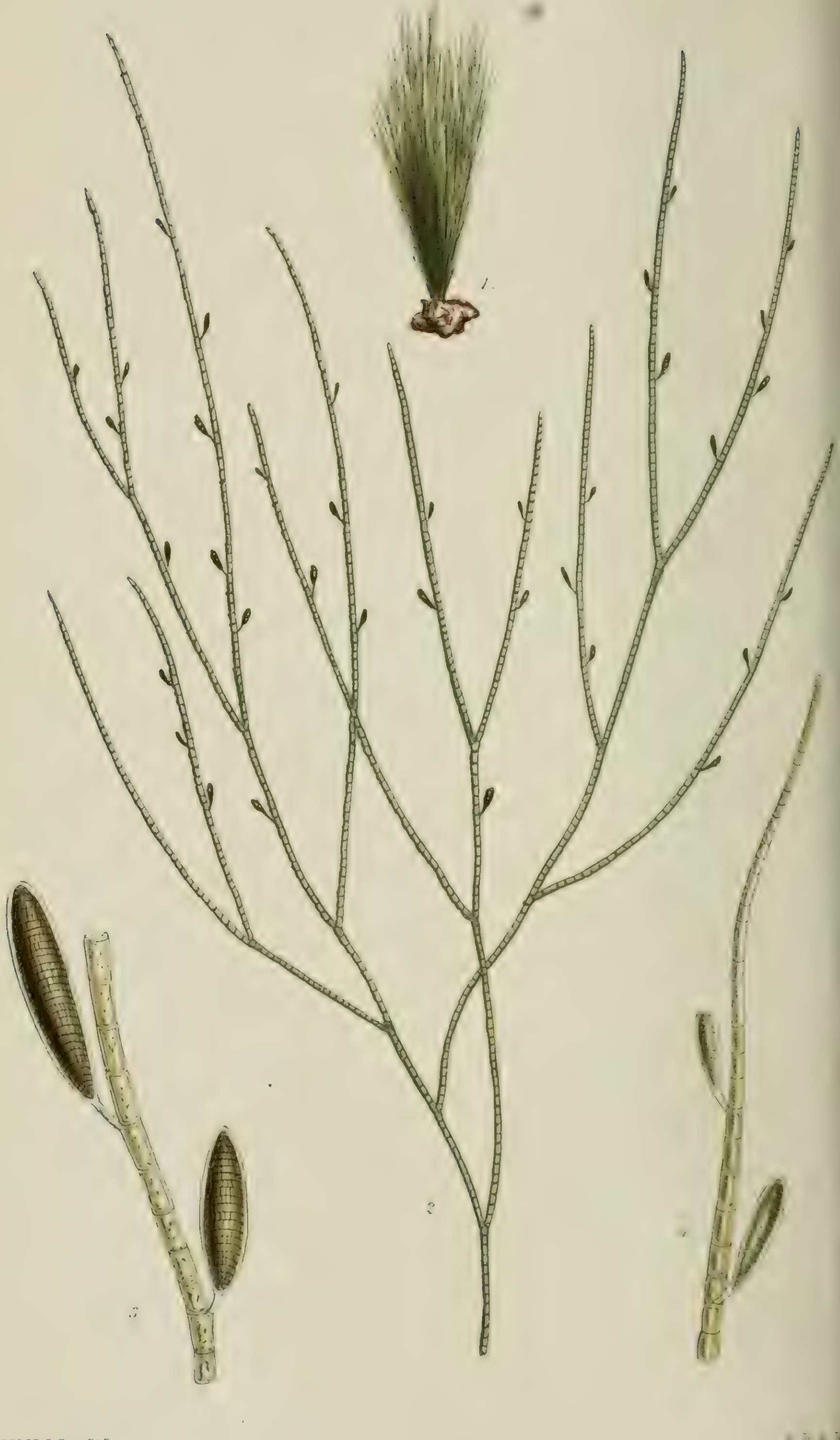
Plate CCLVI



W H H. del et lith

PLATE CCLVII.

ECTOCARPUS FENESTRATUS, *Berk.*

GEN. CHAR. *Frond* capillary, jointed, olive or brown, flaccid, single-tubed, without longitudinal striæ. *Fruit* either spherical or elliptical, external or imbedded spores; or lanceolate, linear, or conical *silicules* (pod-like bodies); or granular masses formed in consecutive cells of the branches. ECTOCARPUS (*Lyngb.*),—from εκτος, καρπος, *external fruit.*

ECTOCARPUS *fenestratus;* pale green, very slender, forming small tufts; filaments not much branched; branches distant, alternate, furnished with a few long and simple, alternate ramuli; articulations of the branches twice or thrice as long as broad, pellucid; silicules stalked, scattered, at first clavate, then elliptic-oblong, obtuse, densely striate transversely, and cross-barred, dark brown.

ECTOCARPUS fenestratus, *Berk. in Herb. Griff. MSS. Harv. Man. Ed.* 2. p. 58.

HAB. Salcombe, *Mrs. Wyatt.* Annual. May.

DESCR. *Filaments* forming small tufts, very slender, one or two inches high, not very much branched; the branches lying apart and somewhat feathery, alternate, repeatedly divided, all the divisions erect, the ultimate ramuli prolonged and straight. *Articulations* variable (as in all the genus), usually in the middle part of the stems twice or thrice as long as broad, full of a pale olive, translucent endochrome, with a very few grains dispersed through it; in the upper part gradually shorter. *Silicules* pedicellate, at first club-shaped and narrow, afterwards becoming elliptic-oblong, or somewhat fusiform, but always very blunt at each end. When fully ripened they are dark coloured, marked with closely set, transverse and longitudinal striæ, which mark the surface with small, square reticulations, like a mosaic pavement, or the lattice of a window; an appearance alluded to in the specific name. *Colour*, pale greenish olive. *Substance* flaccid, closely adhering to paper.

The characters by which this plant is distinguished from others of the genus—namely, simplicity in branching and the peculiar form of the silicule,—appear sufficiently well marked; and we may therefore hope that we have here the foundation of a good species which will be detected in other localities, and in greater abundance than has yet been the case. At present I have only seen a single small specimen, or rather half a specimen, for the tuft that I owe to the kindness of Mrs. Griffiths is cut in two :—and Mrs. Wyatt has only met with it once. This is, however, not to be wondered at, if we consider the extremely local nature of many species of *Ectocarpus*, and that Salcombe, the habitat of our novelty, is a considerable distance from the discoverer's ordinary abode. In appearance *E. fenestratus* is not unlike many specimens of *E. siliculosus*, but the form of the silicule is very different ; and in this character there is a much nearer approach to *E. tomentosus*, a species, which in all other respects, is widely different from *E. fenestratus*.

Fig. 1. ECTOCARPUS FENESTRATUS ; a tuft :—*the natural size.* 2. Portion of a filament :—*magnified.* 3. Small part of the same, with two ripe silicules. 4. Apex, with two young silicules :—*both highly magnified.*

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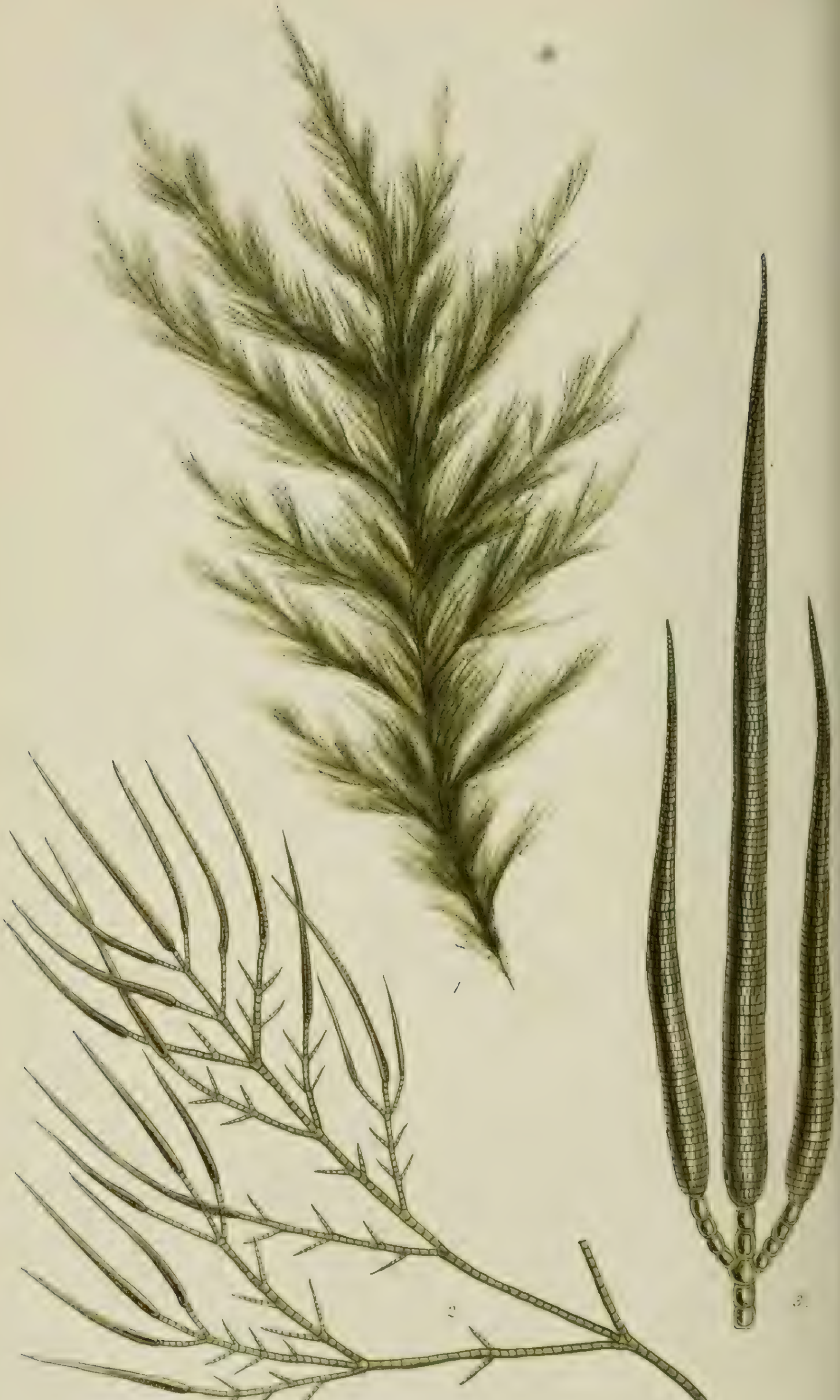

W.H.H. del. et lith.

R.B.&R. imp.

PLATE CCLVIII.

ECTOCARPUS LONGIFRUCTUS, *Harv.*

GEN. CHAR. *Filaments* capillary, jointed, olivaceous or brown, flaccid, without longitudinal striæ. *Fruit* either spherical or elliptical, external or imbedded spores; or lanceolate, linear, or conical *silicules* (pod-like bodies); or granular masses formed in consecutive cells of the branches. ECTOCARPUS (*Lyngb.*),—from εκτος, καρπος, *external fruit.*

ECTOCARPUS *longifructus*; tufts large, branching, the divisions feathery; filaments robust, excessively branched, branches mostly opposite, the lesser ones set with short, spine-like, opposite or rarely alternate ramuli; articulations as long as broad; silicules very long, linear-lanceolate, attenuate, densely striate transversely, terminating the principal branches and ramuli.

ECTOCARPUS longifructus, *Harv. Man. Ed.* 2. p. 61.

HAB. Parasitical on Algæ between tide-marks. Skaill, Orkney, *Mrs. Moffatt.*

DESCR. *Tufts* six or eight inches long, much branched and feathery. *Filaments* robust, not much entangled, excessively divided, the branches and ramuli very generally opposite, sometimes alternate, spreading at wide angles. The smaller branches are furnished with numerous, opposite or alternate, short, spine-like ramuli, and mostly end in the very long silicules which are so striking a feature in this plant. These silicules are very much longer than the branchlet that bears them, and taper from the base to the apex, which is very acute or acuminate: they are closely netted with longitudinal and transverse lines. *Articulations* of the stem and branches about as long as broad, or a little longer. *Colour*, a greenish olive. It closely adheres to paper in drying.

I here figure an *Ectocarpus* from Orkney nearly related to *E. litoralis*, rather than to *E. siliculosus*, and differing chiefly in the greater luxuriance of the frond, and the different form of the fructification. The fructification of our present plant, however, must be regarded more as an exaggeration of that of *E. litoralis* than as essentially different. In *E. litoralis* the apices of the branches grow out beyond the portion converted into fructification, and the latter therefore appears as if it were immersed in the branch; here when the ramuli are fertile the whole of the upper portion of the ramulus becomes the fruit. Such a character, if constant, would very well serve for a specific diagnosis, but its constancy has yet to be tested. Our *E. longifructus* rests at present upon a solitary specimen preserved in the herbarium of the Rev. J. H. Pollexfen, of Clapham, to whom I am indebted for my knowledge of this plant, and who has allowed me to abstract one of the lateral branches of his specimen. Persons visiting Orkney would do well to look carefully after the *Ectocarpi,* among which many more forms may yet be noticed. The characters of these plants cannot always be detected by the naked eye, nor are they easily recognisable except when in fructification. I am fully sensible that it is unsafe to propose new species from an inspection of individual specimens, but there are cases in which this course may safely be taken; and it will be remembered that *Ectocarpus Hincksiæ* is an instance of a species founded, like the present, on a solitary specimen picked up by a lady, but which, in a short time, was ascertained to exist on many distant shores, and which is now well established. I hope the present experiment may be equally successful.

Fig. 1. ECTOCARPUS LONGIFRUCTUS:—*the natural size.* 2. A branch:—*magnified.* 3. Silicules from the same:—*highly magnified.*

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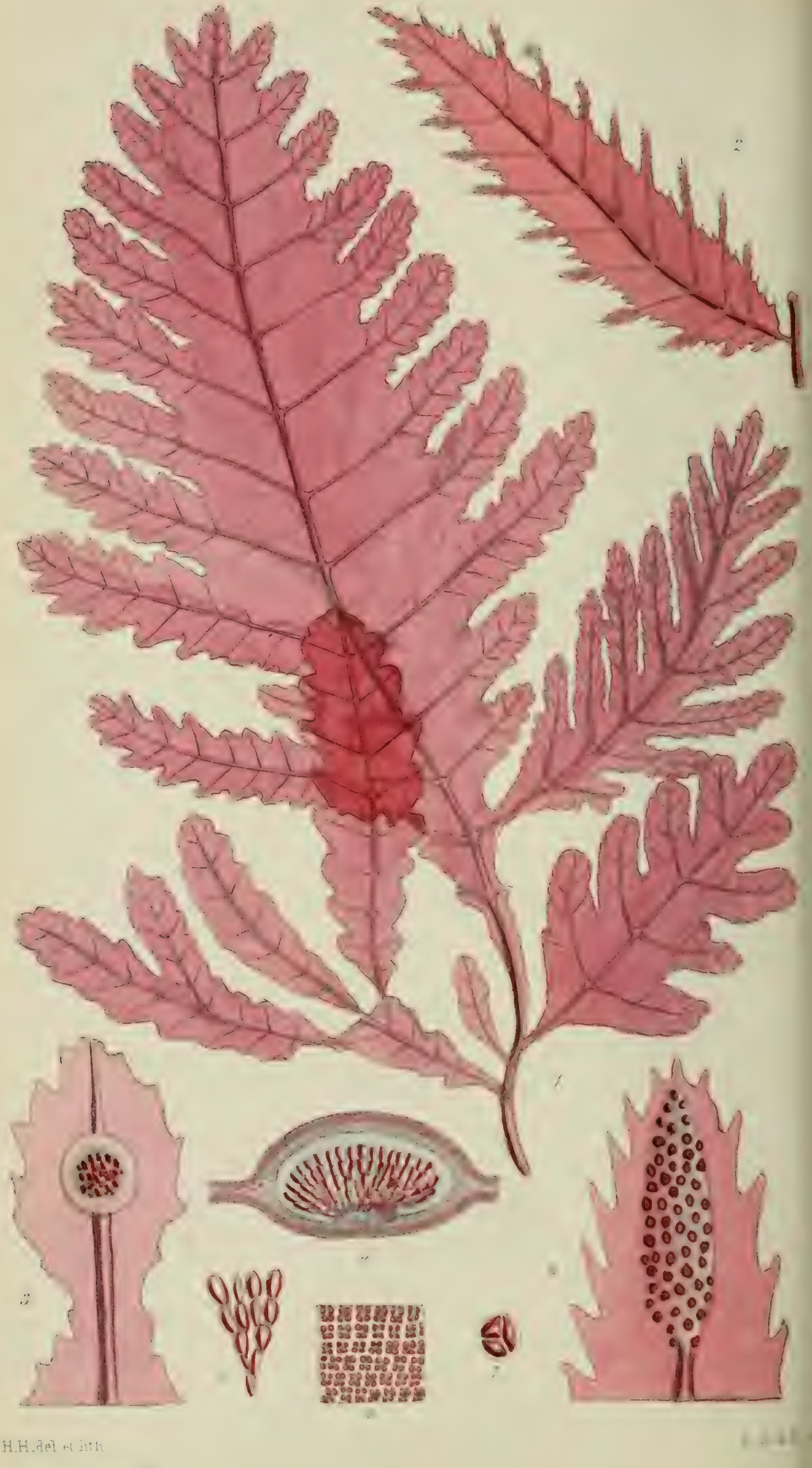
Plate CCLIX.



W. H. H. del et lith

PLATE CCLIX.

DELESSERIA SINUOSA, *Lamour.*

GEN. CHAR. *Frond* rose-red, flat, membranaceous, with a percurrent midrib. *Fructification* of two kinds, on distinct individuals; 1, spherical *tubercles* (*coccidia*) immersed in the frond, and containing a globular mass of angular spores; 2, *tetraspores*, forming defined spots in the frond, or in leaf-like processes. DELESSERIA (*Lamour.*),—in honour of *Baron B. Delessert,* a distinguished botanist and patron of Botany.

DELESSERIA *sinuosa*; stem elongated, branched, beset with oblong or obovate, deeply-sinuated or pinnatifid, toothed, transversely-ribbed leaves.

DELESSERIA sinuosa, *Lamour. Ess.* p. 124. *Lyng. Hydrop. Dan.* p. 7. t. 2. *Ag. Sp. Alg.* vol. i. p. 174. *Ag. Syst.* p. 248. *Hook. Fl. Scot.* part 2. p. 100. *Grev. Fl. Edin.* p. 292. *Grev. Alg. Brit.* p. 73. *Hook. Br. Fl.* vol. ii. p. 285. *Wyatt, Alg. Damn.* no. 62. *Harv. in Mack. Fl. Hib.* part 3. p. 191. *Harv. Man.* ed. 1. p. 55. *Endl. 3rd Suppl.* p. 53.

WORMSKIOLDIA sinuosa, *Spreng. Syst. Veg.* vol. iv. p. 331.

FUCUS sinuosus, *Good. and Wood. in Linn. Trans.* vol. iii. *Eng. Bot.* t. 822. *Turn. Syn.* p. 1. *Turn. Hist.* t. 35.

FUCUS crenatus, *Gm. Hist. Fuc.* p. 184. t. 24. f. 4. *Linn. Syst. Gm.* p. 1388.

FUCUS rubens, *Huds. Fl. Ang.* p. 573. *Lightf. Fl. Scot.* p. 943. *Stack. Ner. Brit.* p. 18. t. 7.

FUCUS roseus, *Fl. Dan.* t. 652.

FUCUS Palmetta, varietas, *Esper, Ic. Fuc.* vol. i. p. 84. t. 42.

HAB. Parasitical on the stems of *Laminaria digitata*; also attached to various substances in deep water. Perennial. Summer and autumn. Common on the British shores.

GEOGR. DISTR. Atlantic shores of Europe and North America.

DESCR. *Root* a small disc. The frond originates in an oblong or obovate, deeply sinuated, or pinnatifid leaf, four to six inches in length, and from one to four inches in breadth, furnished with a strong, percurrent midrib, pinnated with secondary, opposite nerves, one of which runs to the apex of each lacinia of the frond. As the growth of the plant proceeds, the laciniæ become deeper and deeper, and at length the cutting between each reaches the mid-rib; and at the same time the margins of each lacinia become first toothed and then incised, while lesser opposite nervelets are given off to the marginal teeth by their primary nerve. At this stage the midrib of of the first-formed leaf has become a stem pinnated with a great number of leaves, of similar form and structure to what the first leaf had been; and at a further period various irregularities of branching, some caused by laceration, some by proliferous growth, take place, till there results a much branched stem, well clothed with pinnatifid leaves. The margin is sometimes slightly toothed, and sometimes cut into very slender processes, or cilia; and not uncommonly, when the plant vegetates at a depth of 6–10 fathoms, every lacinia is drawn out at the apex into tendrils, and the depauperated lamina very much cut into narrow, jagged processes. *Tubercles* solitary, either seated on the nerves of the leaf, or borne on little leaflets rising from the nerve, depressed, containing a tuft of beaded filaments, finally resolved into spores. *Tetraspores* in oblong or linear marginal sori, formed at the apices of the lateral nerves, often confined to the slender, marginal processes. *Colour*, a beautiful purplish crimson or lake. In drying, the frond adheres to paper.

* * *

Next to *D. sanguinea* (Tab. CLI.) this, when well grown, and of large size, is one of the handsomest of the genus. Our plate represents the frond in rather a young state, a specimen having been chosen for figuring which exhibits the changes that take place in form during the growth of the frond. At first the plant consists of a simple, penninerved leaf sinuated at the margins. The sinuosities gradually deepen into lateral lobes; and these lobes, as is shown in the lower part of the figure, deepen into branches, or new fronds, at first sinuous, then lobed and at length divided like the fronds from which they grow. Thus, eventually, a much branched and leafy frond results from the original leaf, by regular growth and subdivision of the margin. When any vigorous part is wounded, an irregular, proliferous growth likewise takes place, new leaflets springing from any part of the midrib. Sometimes the margin is much laciniated.

D. sinuosa is abundant throughout the Northern Atlantic. In the Southern Ocean it is represented by *D. quercifolia* and *D. Lyallii*, two very beautiful species which resemble it closely in form and mode of growth, but which are essentially different.

Fig. 1. A young and vigorous frond of DELESSERIA SINUOSA. 2. Leaf from an old frond, of the cut variety, with sori of tetraspores in the marginal lobes:—*both of the natural size.* 3. Marginal lobe with tubercle. 4. Section of the tubercle. 5. Strings of spores, from the same. 6. Marginal lobe, with sorus, formed out of the apex of the nerve. 7. Tetraspore. 8. Portion of the surface:—*all magnified.*

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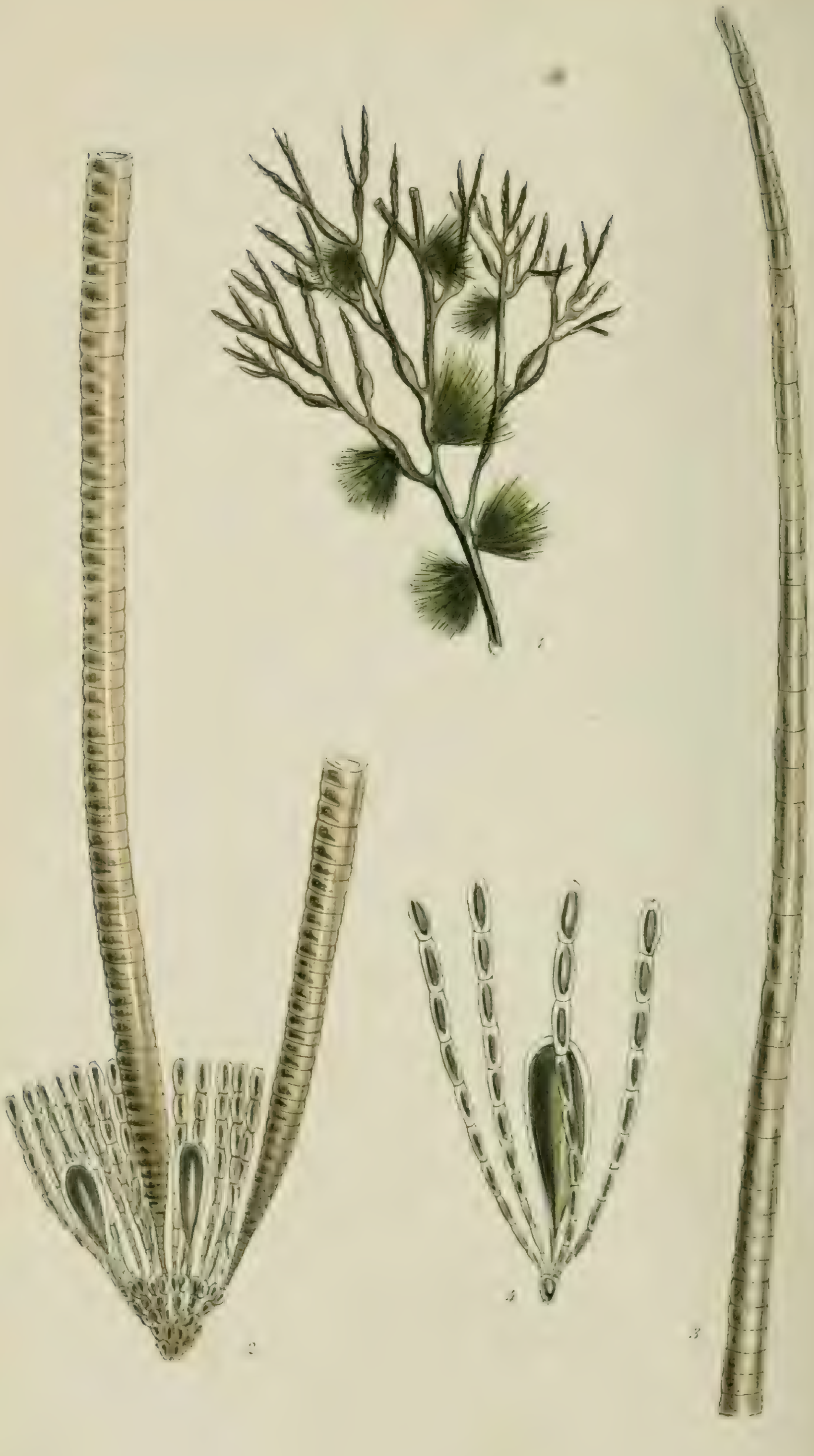
Plate CCLX



W.H.H. del et lith.

PLATE CCLX.

ELACHISTEA FLACCIDA, *Aresch.*

EN. CHAR. *Frond* parasitical, consisting of a dense tuft of free, simple, articulated, olivaceous filaments, rising from a common tubercular base, composed of vertical, branching fibres, closely combined into a cartilaginous mass. *Fructification*, pear-shaped spores attached to the bases of the filaments concealed in the tubercles, and frequently accompanied by paranemata. ELACHISTEA (*Fries*), — from ἐλαχιστα, the *least*; from the small size of these plants.

LACHISTEA *flaccida*; tufts pencilled: filaments elongate, flaccid, membranaceous, much attenuated to the base; the lower articulations half as long as broad, the upper of equal length and breadth; tubercle hemispherical.

ELACHISTEA flaccida, *Aresch.—J. Ag. Gen. et Sp. Alg.* vol. i. p. 12. *Harv. Man.* ed. 2. p. 50. *Fr. Fl. Scan.* p. 317. *Eng. Bot.* t. 2912.

ELACHISTEA breviarticulata, *Aresch. in Linn.* vol. xvi. p. 234. t. 8. f. 5.

PHYCOPHILA flaccida, *Kütz. Phyc. Gen.* p. 330.

MYRIONEMA breviarticulatum, *Endl.* 3*rd Suppl.* p. 23.

CONFERVA flaccida, *Dillw.* t. G. *Harv. in Hook. Br. Fl.* vol. ii. p. 355. *Harv. in Mack. Fl. Hib.* part 3. p. 227. *Harv. Man.* ed. 1. p. 132. *Wyatt, Alg. Damn.* no. 292.

CONFERVA obtusa, *Ag. Syst.* p. 101.

CONFERVA breviarticulata, *Suhr, in Flora* 1831, p. 32. t. 4. f. 36, *x, y, z.*

HAB. Parasitical on *Cystoseira fibrosa*, common. Annual. Summer and autumn.

GEOGR. DISTR. Atlantic coasts of France and England.

DESCR. *Tubercle* small, one to three lines in diameter, hemispherical, very firm, composed of moniliform, dichotomous fibres densely compacted together, and not easily separable. From the tips of the fibres composing the tubercle spring the filaments, which are half an inch long, or something more, tapering extremely at the base, then rapidly widening to the middle, from which they taper very gradually to the upper extremity. *Articulations* in the lower and middle parts of the filament not quite half as long as broad, in the upper part as long as, or rather longer than, their breadth; the apex obtuse. Between the filaments spring numerous linear clavate paranemata, tapering to the base, and gradually swelling upwards; these have oval articulations, about thrice as long as broad. *Spores* lodged among the paranemeta, obovate, on slender, short pedicels, dark olive. *Substance* flaccid and soft, readily adhering to paper in drying. *Colour* a pale greenish olive, sometimes yellowish or foxy.

A very common parasite on *Cystoseira fibrosa*, whose branches are rarely found free from the olive-coloured soft pencils of this little plant. In size and appearance to the naked eye there is much resemblance to *Elachistea fucicola* (Tab. CCXL.), except that the colour is generally greener, and the length of the tufts rather less; but under the microscope these species are very readily known from one another. *E. flaccida* is remarkable for the shortness of its articulations, in proportion to their breadth throughout the lower and middle portions of the filaments, and for the gradually increasing length of the cells towards the apices. The filaments, also, taper exceedingly at the base; and the tubercle from which they originate is of very much smaller size than in *E. fucicola.*

Fig. 1. Tufts of Elachistea flaccida growing on *Cystoseira fibrosa.* 2. Vertical section of part of a frond, showing a portion of the tubercle, with paranemata and spores, and part of two filaments. 3. Apex of a filament. 4. Spore, with its paranemata:—*all magnified.*

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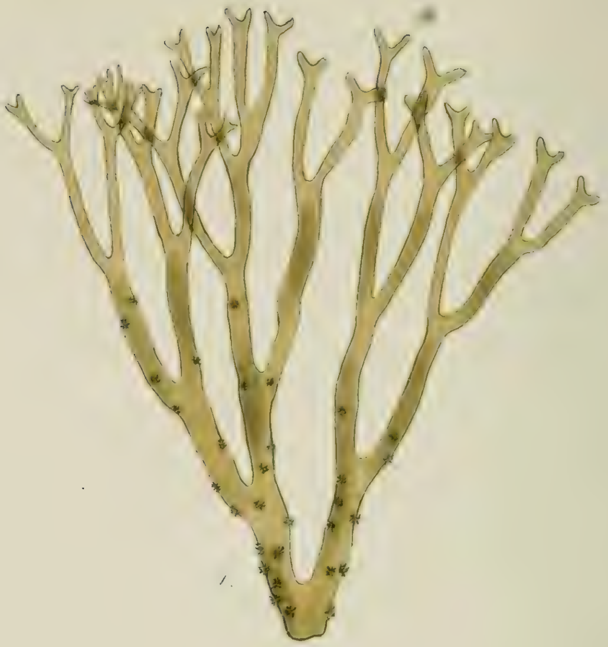
Plate CCLX



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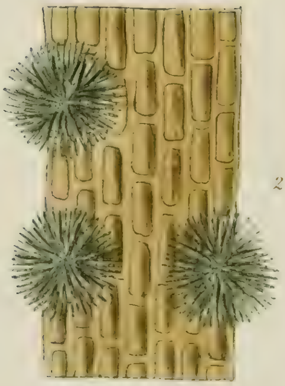

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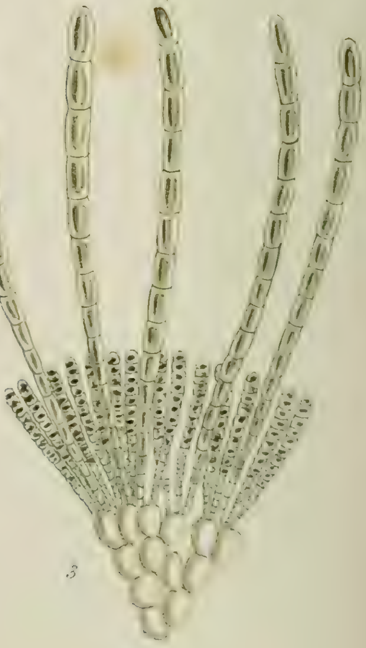

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W.H.H. del et lith

R. B. & R.

PLATE CCLXI.

ELACHISTEA STELLULATA, *Griff.*

GEN. CHAR. *Frond* parasitical, consisting of a dense tuft of free, simple, articulated, olivaceous filaments, rising from a common tubercular base, composed of vertical, branching fibres, closely combined into a cartilaginous mass. *Fructification*, pear-shaped spores attached to the bases of the filaments concealed in the tubercle, and frequently accompanied by paranemata. ELACHISTEA (*Fries*), — from ἐλαχιστα, the *least*; from the small size of these plants.

ELACHISTEA *stellulata*; tufts very minute, stellate; tubercle composed of large cells; filaments short, tapering to the base, linear club-shaped, obtuse; articulations about twice as long as broad, uniform; paranemata with short articulations.

ELACHISTEA stellulata, *Griff. MSS. Aresch. Pug. in Linn.* vol. xvii. p. 261. tab. 9. f. 4. *Harv. Man.* ed. 2. p. 51.

MYRIONEMA stellulatum, *J. Ag. et Gen. Sp. Alg.* vol. i. p. 49.

CONFERVA stellulata, *Harv. Man.* ed. 1. p. 132.

HAB. Parasitical on *Dictyota dichotoma*. Annual. Summer. Torquay, *Mrs. Griffiths.*

GEOGR. DISTR. Not observed out of England.

DESCR. *Tufts* exceedingly minute, scarcely half a line in diameter, appearing like dark brown specks, dotting over the surface of the *Dictyota*, and under the microscope resembling miniature *echini*. *Tubercle* well developed, composed of dichotomous strings of large, colourless cells. From the terminal cell of each string the filaments and paranemata arise. *Filaments* a quarter of a line in length, linear-clavate, gradually tapering from the obtuse apex to the base the articulations of nearly uniform size, all being from once and a half to twice as long as broad, constricted at the joints. Each articulation contains a bag of rather dark coloured endochrome. *Paranemata* very numerous, springing with the filaments, and about one-third as long, with very short articulations, club-shaped. *Spores* unknown to me. They are figured by Dr. Areschoug as obovate-oblong.

* * *

This minute and microscopically beautiful little plant was discovered some years ago by Mrs. Griffiths on the old fronds of *Dictyota dichotoma*, and first described in the first edition of the Manual of British Algæ. I have not seen any other specimens than those originally collected by Mrs. Griffiths, who met with the parasite infesting several specimens of the *Dictyota*; nor am I aware that any other observer has noticed it in Britain, or that it has been detected elsewhere. The Alga on which it grows is so very widely scattered that our *Elachistea* ought, probably, to have a place in many distant floras, but its minute size has hitherto been its protection. It looks so much like the fructification of the *Dictyota*, when carelessly examined with the naked eye, or with a lens of small power, that it may often be passed over as such ; and I was once disposed to think that it might be merely a diseased proliferous state of that fructification. This opinion I have long abandoned, and recognised this production as a parasite, and true member of the genus *Elachistea*. In this latter point, however, I am at issue with my friend Professor J. Agardh, who places *E. stellulata* in the genus *Myrionema*. As far as size and outward characters go, such a position seems natural, but it will be found on closer inspection, that the filaments here are of two kinds, exactly as in *Elachistea*, and that they spring not from decumbent, adnate filaments, as in *Myrionema*, but from erect, radiating ones, compacted into a little tubercle.

Fig. 1. Part of a frond of *Dictyota dichotoma*, infested with the ELACHISTEA :—*of the natural size.* 2. Some of the tufts on a portion of the membrane :—*magnified.* 3. Vertical section of a part of tuft, most of the filaments removed :—*highly magnified.*

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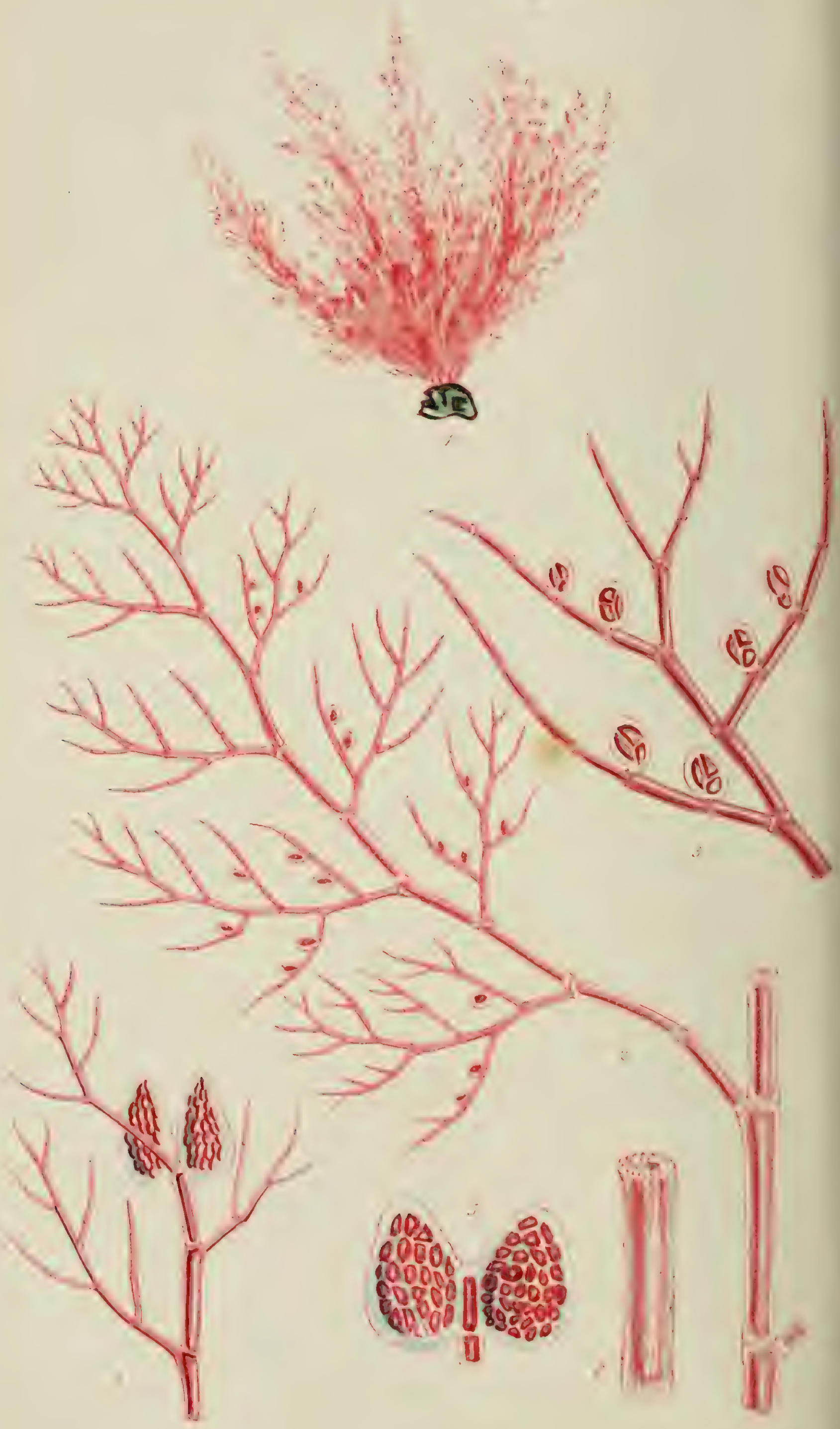
Plate CCLXII.



W. H. H del. et lith.

Plate CCLXII.

CALLITHAMNION BYSSOIDEUM, *Arn.*

Gen. Char. *Frond* rosy, or brownish-red, filamentous; stem either opake and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds on distinct plants; 1, external *tetraspores*, scattered along the ultimate branches, or borne on little pedicels; 2, roundish or lobed, berry-like receptacles (*favellæ*), seated on the main branches, and containing numerous, angular spores. Callithamnion (*Lyngb.*),—from καλλος, *beauty*, and θαμνιον, a *little shrub.*

Callithamnion *byssoideum*; stems exceedingly slender, flaccid, and byssoid, much divided; branches lanceolate in outline, virgate, set with numerous long, slender, flexuous, pinnate or subbipinnate plumules; articulations of the branches eight times, of the ramuli four times as long as broad; tetraspores, one or two, sessile on the pinnules, elliptical; favellæ binate, subterminal.

Callithamnion byssoideum, *Arn. MSS. Harv. in Hook. Br. Fl.* vol. ii. p. 342. *Wyatt, Alg. Damn.* no. 185. *Harv. Man.* ed. 1. p. 107.

Hab. On several Algæ, in tide-pools near low-water mark; on *Codium tomentosum*, especially. Annual. Summer. Whitsand Bay, *Dr. Jacob.* Devonshire, *Mrs. Griffiths.* Salcombe, *Mrs. Wyatt.* Plymouth, *Rev. W. Hore and Dr. Cocks.* Portaferry, Strangford Lough, *Mr. W. Thompson.* Dublin Bay, and Cork Harbour, *W. H. H.* Not an uncommon species.

Geogr. Distr. Not noticed out of Britain.

Descr. *Filaments* extremely slender, as fine as cobwebs, densely tufted, from two to four inches long, excessively branched in a decompound-pinnate manner, all the divisions alternate and distichous. The whole frond, when displayed on paper, has an ovate or pyramidal outline, the lowermost branches being longer than the upper ones; each individual branch is narrow-lanceolate, when taken in connection with the plumules with which it is clothed. These plumules are slender, and flexuous, simply or doubly pinnated, laxly set, with few and distant pinnules; the latter very long, and destitute of ramuli or lateral processes. *Articulations* of the stem and branches of great length, 6–8 times longer than broad, destitute of internal veins, except in the lower part of the stem; articulations of the ramuli at least four times as long as broad, but often more. *Tetraspores* elliptical, sessile, rather large, borne on the sides of the pinnules, towards the base, one or two, rarely more, on each pinnule. *Favellæ* binate, generally terminating truncated branches. *Colour*, a fine rosy lake, with a slightly purple or sometimes brown hue. *Substance* exceedingly tender and gelatinous, closely adhering to paper in drying.

This species was first collected, it would seem, by Dr. Jacob at Whitsand bay, and first recognised as new by Professor Walker Arnott, from whom I first received specimens under this name,—a name adopted in the British Flora, and now generally recognised. *E. byssoideum* is one of the softest and most gelatinous of the genus, having exceedingly slender fronds, growing in dense tufts. To the naked eye it frequently bears much resemblance to *C. corymbosum,* so much that it sometimes requires a microscope to determine to which species the specimen under examination may belong. The ultimate branching, and the position of the tetraspores will then afford an easily seen character, by which the two plants may be distinguished. There is a much closer affinity, indeed, between *C. byssoideum* and *C. roseum,* than between the former and *C. corymbosum.* From *C. roseum* our plant is chiefly known by its much greater delicacy and softer substance, and its adhering much more closely to paper, and being more glossy when dry.

Fig. 1. CALLITHAMNION BYSSOIDEUM; a tuft:—*of the natural size.* 2. Part of branch, with bipinnate plumule. 3. Pinnules, bearing tetraspores from the same. 4. Part of a branch with favellæ. 5. A favella. 6. Articulations from the lower part of the stem:—*all more or less highly magnified.*

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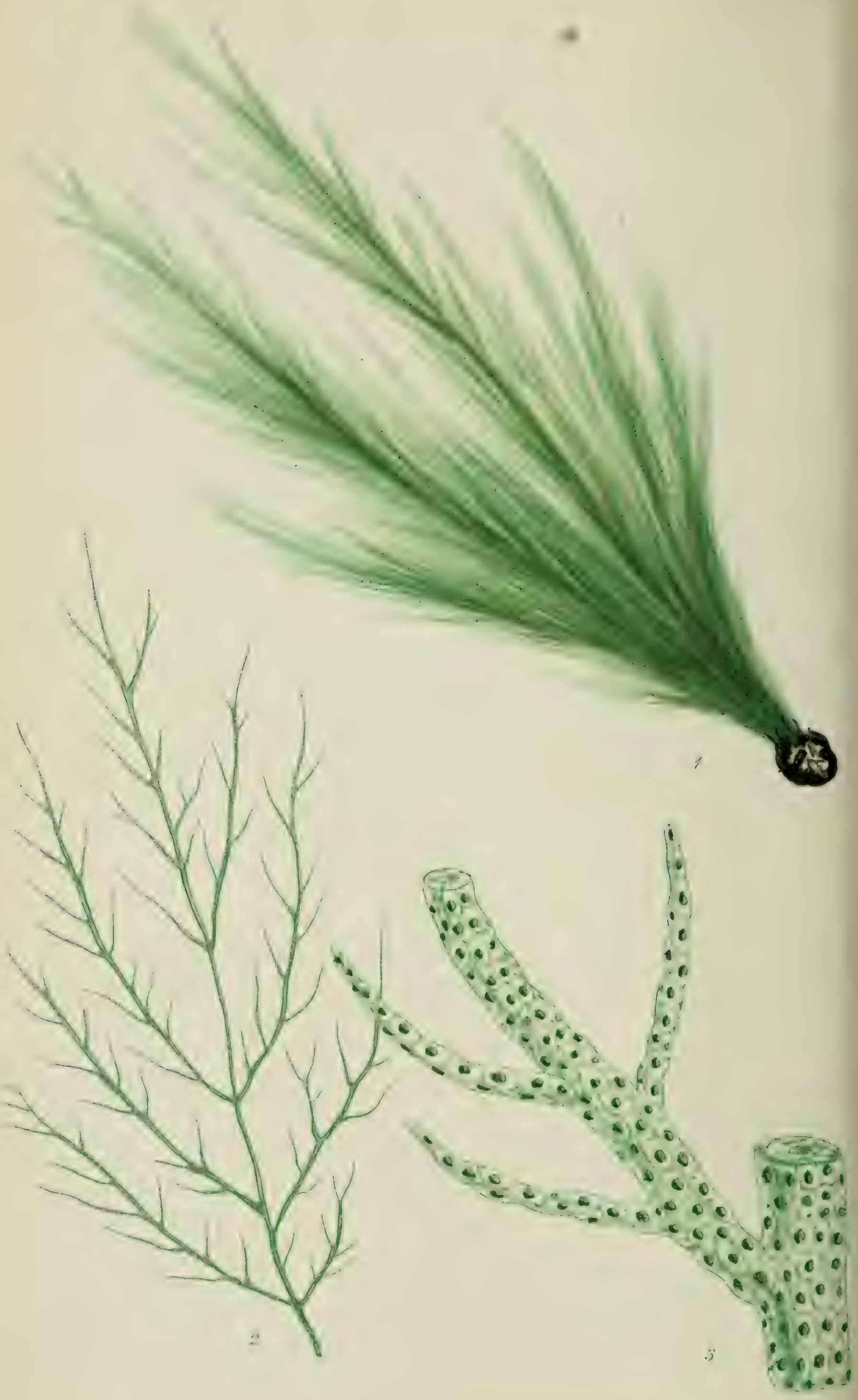
Plate CCLXIII



W.H.H. del et lith.

[illegible]

PLATE CCLXIII.

ENTEROMORPHA HOPKIRKII, *M'Calla.*

GEN. CHAR. *Frond* tubular, membranaceous, of a green colour, and reticulated structure. *Fructification;* granules, commonly in fours, contained in the cellules of the frond. ENTEROMORPHA (*Linn.*),—from εντερον, an *entrail,* and μορφη, *form* or *appearance.*

ENTEROMORPHA *Hopkirkii*; frond excessively slender and byssoid, flaccid, very much branched; branches feathery, decompound, erect, attenuated, set with minute, subulate ramuli; cellules large, hyaline, each cell containing one or two minute grains of endochrome; the ramuli composed of a single series of such cellules.

ENTEROMORPHA Hopkirkii, *M'Calla, Alg. Hib. ined. Harv. in Phyc. Brit.* vol. i. pl. XV. *Harv. Man.* ed. 2. p. .

HAB. Dredged in 4–10 fathoms water. Annual. Summer and autumn. Goodrington, Torbay, *Mrs. Griffiths* (1838). Carrickfergus, *Mr. M'Calla* (1845).

GEOGR. DISTR. ——?

DESCR. *Fronds* six to twelve inches long or more, of exceedingly fineness and delicacy, the main stems being scarcely the diameter of human hair, the branches and ramuli very much more slender; excessively branched and feathery, the branches erect, straight, alternate, or rarely opposite, tapering to a fine point, repeatedly decompound, the ultimate divisions set with minute, awl-shaped ramuli. The structure of the frond is peculiarly lax. The cells in the branches are of large size, about three or four visible in the breadth of the branch, hyaline, containing generally a single small grain of grass-green endochrome or *chlorophyll.* The ultimate ramuli consist of a single series or string of such cells, or, in other words, are articulated. There is much less difference between the diameter of the larger and smaller branches in this species than in most others of the genus. *Colour* a pale yellowish green, becoming paler in drying. *Substance* exceedingly flaccid and tender, most closely adhering to paper in drying.

* * *

I am not prepared to defend the *characters* of all the species of the genus *Enteromorpha*; but among our British kinds the present one is remarkable for having some points easily recognisable, and for being a plant of much delicacy and beauty. It rivals in the tenuity of its fronds, and in their bushy branching, the most delicate of the *Cladophoræ,* having, to the naked eye, an aspect not very unlike that of *C. Rudolphiana,* and being more slender than *C. gracilis.* Under the microscope it is known by the very large size of its nearly empty cells, in the centre of which a small spherical grain of emerald-green endochrome is found. The ramuli are so slender that they consist of a single row of such cells, and thus have something the character of the threads of a *Conferva*.

My first knowledge of this species was from specimens dredged in 1838 by Mrs. Griffiths in Torbay. They remained in my Herbarium unnamed until the plant was again found, in 1845, by the late Mr. M'Calla, who bestowed the name as a tribute of grateful respect to Mr. Thomas Hopkirk, author of "Flora Glottiana," from whom he had received kindness whilst resident in the neighbourhood of Belfast. In now adopting Mr. M'Calla's specific name I wish to record the regret I feel, in common with all naturalists acquainted with his merits, that death should so soon have closed a career which opened with much promise of future fame. The readers of the Phycologia must be well acquainted with the name of Mr. William M'Calla, in connection with the habitats of many of our rarest Algæ. It is therefore almost superfluous to say that he was well acquainted with the species, and had a most acute eye to detect a minute species, and a most accurate judgment to discriminate one varying form from another. But though Algæ were the natural objects in which, of late, he chiefly delighted, he had a very extensive knowledge of marine zoology, and has made large additions to the Irish Faunæ. Born in very humble circumstances, imperfectly educated, and always with narrow means, he had to struggle through life with many hindrances to progress. That he overcame many of those hindrances is a proof of his talents and energy; that he did not overcome all may well be forgotten by those who have not had to struggle with any, and yet feel disposed to criticise the short-comings of others. Mr. M'Calla fell a victim to Cholera, in May 1849, aged about 35.

Fig. 1. ENTEROMORPHA HOPKIRKII:—*of the natural size.* 2. Portion of a branch:—*magnified.* 3. Small fragment of the same, with its subulati ramuli:—*very highly magnified.*

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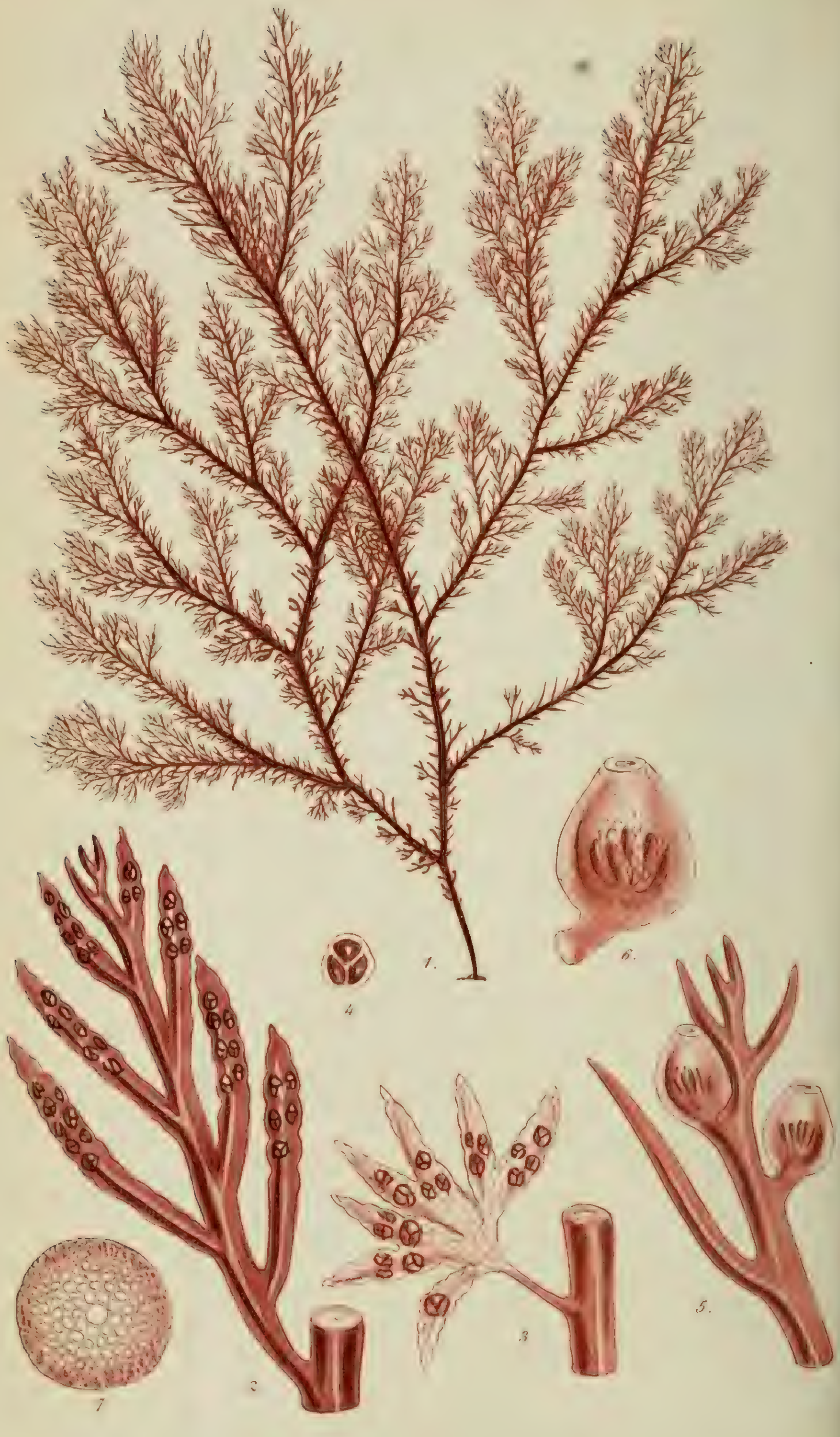
Plate CCLXIV



W.H.H. del et lith.

R. B. & R. imp.

Plate CCLXIV.

RHODOMELA SUBFUSCA, *Ag.*

Gen. Char. *Frond* filiform, solid, much branched, inarticulate, reticulated; the axis composed of concentric layers of oblong, hyaline cells; the periphery of several rows of minute, irregular, coloured cellules. *Fructification,* 1, ovate *capsules* (*ceramidia*), containing a tuft of pear-shaped spores; 2, *tetraspores* immersed in swollen ramuli, or contained in proper pod-like receptacles (*stichidia*) in a single or double row. Rhodomela (*Ag.*),—from ῥοδεος, *red,* and μελας, *black*; because the species usually become darker in drying.

Rhodomela *subfusca*; frond filiform, much branched; the branches irregularly divided, clothed with pinnated branchlets, and subulate, simple scattered or fasciculate ramuli; pinnules subulate; tetraspores contained either in the somewhat swollen ultimate ramuli (in summer), or in proper branching stichidia (produced in winter).

Rhodomela subfusca. *Ag. Sp. Alg.* vol. i. p. 378. *Ag. Syst.* p. 199. *Spreng. Syst. Veg.* vol. iv. p. 343. *Grev. Alg. Brit.* p. 193. *Hook. Br. Fl.* vol. ii. p. 294. *Wyatt, Alg. Damn.* no. 111. *Harv. in Mack. Fl. Hib.* part 3. p. 197. *Harv. Man.* ed. 2. p. 79. *Endl. 3rd Suppl.* p. 47.

Lophura cymosa, *Kütz. Phyc. Gen.* p. 435.

Gigartina subfusca, *Lamour. Ess.* p. 48. *Lyngb. Hyd. Dan.* p. 47. t. 10. *Grev. Fl. Edin.* p. 289.

Sphærococcus subfuscus, *Hook. Fl. Scot.* part 2. p. 104.

Fucus subfuscus, *Woodw. in Linn. Trans.* vol. i. p. 131. t. 12. *Good. and Woodw. Linn. Trans.* vol. iii. p. 212. *Turn. Syn. Fuc.* p. 350. *Turn. Hist.* t. 10. *E. Bot.* t. 1164. *Esper, Ic. Fuc.* vol. ii. p. 11. t. 117.

Fucus confervoides, *Huds. Fl. Ang.* p. 591.

Fucus variabilis, *Good. and Woodw. Linn. Trans.* vol. iii. p. 220.

Fucus setaceus, *Wulf. Crypt. Aquat.* no. 40.

Hab. On rocks and shells, in pools between tide marks; sometimes on the larger Algæ. Biennial or perennial. Spring and summer. Generally dispersed round the coast.

Geogr. Distr. Atlantic shores of Europe and North America.

Descr. *Root* a small thin disc. *Fronds* generally tufted, from three to twelve inches in length, varying greatly in diameter, sometimes not thicker than hogs' bristle, sometimes twice or four times as thick, tapering upwards, cylindrical, much branched. *Branches* long and virgate, sometimes undivided, sometimes forked, mostly alternate, imperfectly distichous, or spirally placed, well furnished, in summer, with alternate lateral secondary branches. These secondary branches are sometimes long, and repeatedly pinnate, sometimes short and simply pinnate; sometimes they are absent altogether, and their place supplied by numerous, scattered or clustered, awl-shaped, simple ramuli. These ramuli are rarely absent on the lower parts of the branches and stem. In winter all the secondary branches fall off, leaving merely the main branches, to which the stumps of the fallen ramuli adhere, and give them a singularly uncouth aspect. In spring the frond pushes out a new series of more slender and decompound ramuli than it had borne the first season. The whole frond is perfectly opake, without any appearance of articulation. *Capsules* ovate, sessile, or on very short peduncles, borne on the pinnules in summer. *Tetraspores* produced both in summer and winter; in summer immersed in the apices of the pinnules, which are then slightly distorted; in winter contained in special receptacles, or *stichidia*, which spring from the sides of the main branches. These stichidia are raised on slender peduncles, forked, and tufted. *Colour* a brownish red, becoming very dark in drying. *Substance* cartilaginous, very rigid in the branches, more flaccid in the ramuli, long resisting the action of fresh water.

This plant is so different in appearance when collected in summer and in winter that it may well be taken by the young botanist for two. The summer specimens are well clothed with slender, multifid and soft ramuli, which lengthen as the season advances, and drop off before winter, leaving bare stems rough with broken stumps.

The *tetraspores* are found either in summer or in winter. At the former season they are simply immersed in the terminal ramuli; at the latter they will be found lodged in small branching *stichidia* scattered irregularly along the sides of the branches.

Except in its much more bushy and branching habit and paler colour, there is a very close resemblance between this species and *R. lycopodioides* (Tab. L.)

Fig. 1. RHODOMELA SUBFUSCA:—*of the natural size.* 2. Pinnated (summer) branchlet with tetraspores in the pinnules. 3. Tufted stichidia (winter) with tetraspores. 4. A tetraspore. 5. Branchlet with capsules. 6. A capsule or ceramidium. 7. Transverse section of the stem:—*all more or less highly magnified.*

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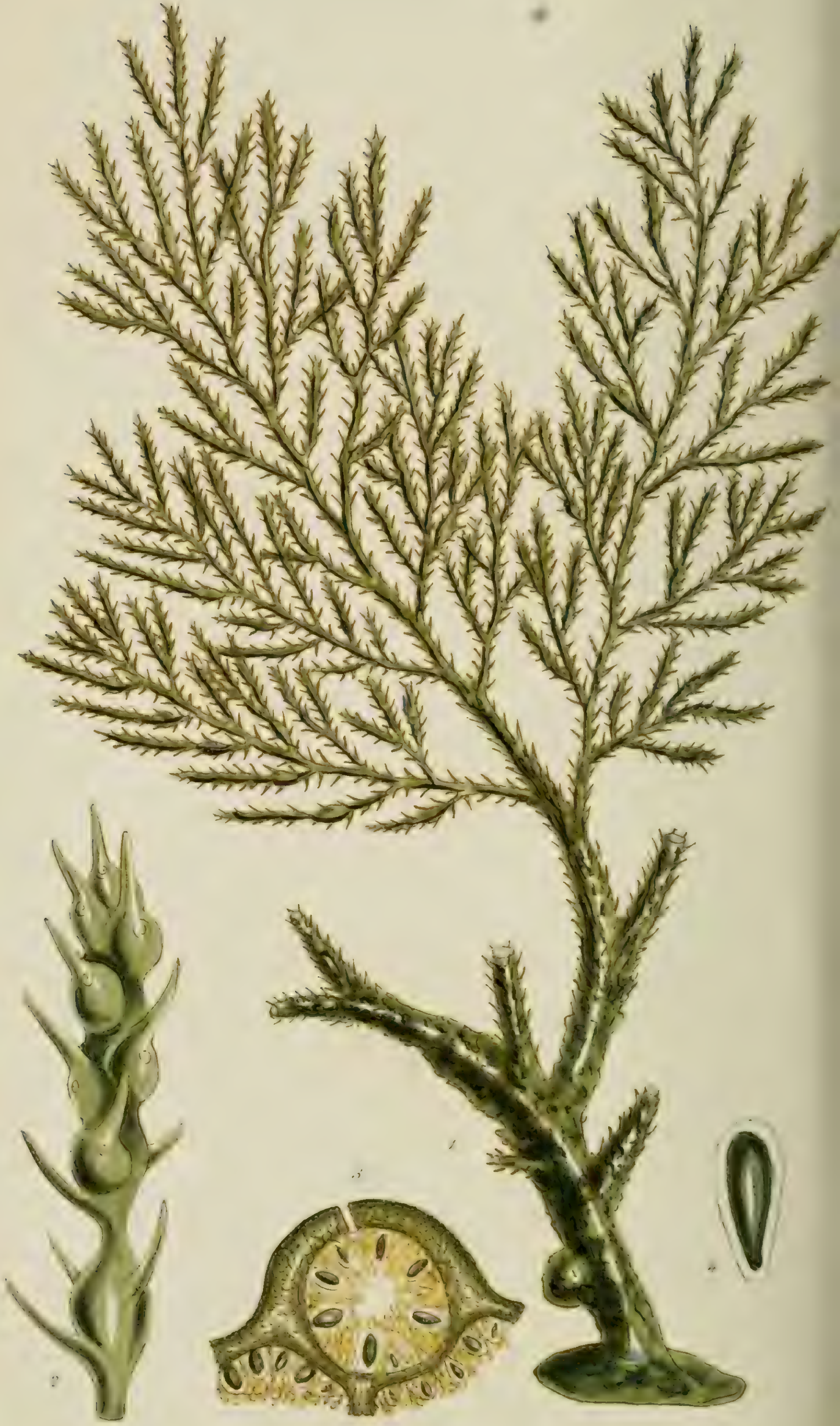
Plate CCLX



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R.B. & P.

Plate CCLXV.

CYSTOSEIRA ERICOIDES, *Ag.*

Gen. Char. *Frond* much branched, occasionally leafy at the base; *branches* becoming more slender upwards, and containing strings of simple air-vessels within their substance. *Receptacles* terminal, small, cellular, pierced by numerous pores, which communicate with immersed, spherical *conceptacles*, containing parietal *spores* and tufted *antheridia*. Cystoseira (*Ag.*),—from κυστις, a *bladder*, and σειρα, a *chain*; because the air vessels are often arranged in strings.

Cystoseira *ericoides*; stem thick, woody, short, cylindrical, beset with numerous, slender, filiform branches, variously divided, and densely clothed with small, spine-like, awl-shaped ramuli; air-vessels small, solitary beneath the apices of the branches; receptacles cylindrical, armed with awl-shaped processes.

Cystoseira ericoides, *Ag. Sp. Alg.* vol. i. p. 52. *Ag. Syst.* p. 281. *Spreng. Syst. Veg.* vol. iv. p. 316. *Grev. Alg. Brit.* p. 4. *Hook. Br. Fl.* vol. ii. p. 265. *Harv. in Mack. Fl. Hib.* part 3. p. 167. *Harv. Man.* p. 18. *Endl. 3rd Suppl.* p. 30. *J. Ag. Gen. et Sp. Alg.* vol. i. p. 221.

Halerica ericoides, *Kütz. Phyc.* p. 354.

Fucus ericoides, *Sp. pl.* p. 1631. *Good. and Wood. in Linn. Trans.* vol. iii. p. 130. *E. Bot.* t. 1968. *Turn. Hist.* t. 191.

Fucus tamariscifolius, *Huds. Fl. Ang.* p. 576. *Stack. Ner. Brit.* p. 44. t. 11. *Turn. Syn. Fuc.* p. 88. (*excl. syn. Gmel.*)

Fucus selaginoides, *Esper, Ic. Fuc.* vol. i. p. 69. t. 31. (*excl. syn. Gmel.*) *Good. and Wood. Linn. Trans.* vol. iii. p. 132. *Turn. Syn.* p. 85.

Hab. On marine rocks, near low-water mark and in tide-pools. Perennial. Summer and autumn. Frequent on the shores of the south of England and south and west of Ireland. Yarmouth Reach, *Mr. Turner*. Port Rush, Antrim, *Mrs. Ovens*.

Geogr. Distr. On the Atlantic shores of Europe and the north of Africa.

Descr. *Root* a large conical or flattened disc. *Frond* generally solitary, twelve to eighteen inches in length, rising with a cylindrical stem nearly half an inch in diameter. This stem is four to six inches long, and either simple or forked, or having four or five main divisions, which support numerous slender, crowded, bitripinnated branches. *Branches* as thin as whip-cord, decompound, all the divisions alternate and distichous, densely set with short, spine-like ramuli or leaves, each of which has a gland-like pore on its back, near the base. *Air vessels* few and small, oblong, placed usually in the terminal branchlets just below the base of the receptacle. *Receptacles* formed in the apices of all the branches, oblong, cylindrical, becoming nodose, always armed with spine-like ramuli, similar to those that clothe the branches. *Spores* obovate, with wide borders. When growing, under water, the frond reflects beautiful prismatic colours, which are lost when it is lifted into the air:—the colour is then a yellowish olive. On being dried the frond turns black, and shrinks considerably. *Substance* tough and leathery.

This is one of the most beautiful of the British species of *Cystoseira*, especially when seen growing under water. It then appears clothed with the richest tints of blue and green, more like those phosphorescent gleams that flash from the lower marine animals than any vegetable colours. As each twig waves to and fro in the water the hues vary, and sometimes, when the light falls partially on a branch, some portions seem covered with sky-blue flowers, while others remain dark. All these beautiful tints perish when the plant is removed from the water. The specific name *ericoides*, or heath-like, alludes both to the brilliant colouring and the shrubby character of the frond, which is covered with small ramuli resembling the leaves of a heath.

C. ericoides is common on the southern shores of our islands, and becomes gradually less frequent towards the north. It has been once found on the coast of Ayrshire by the Rev. D. Landsborough.

Fig. 1. CYSTOSEIRA ERICOIDES :—*of the natural size.* 2. Receptacle and vesicle, both formed in the apex of a branch. 3. Section of a conceptacle, showing the spores and antheridia. 4. A spore :—*all more or less magnified.*

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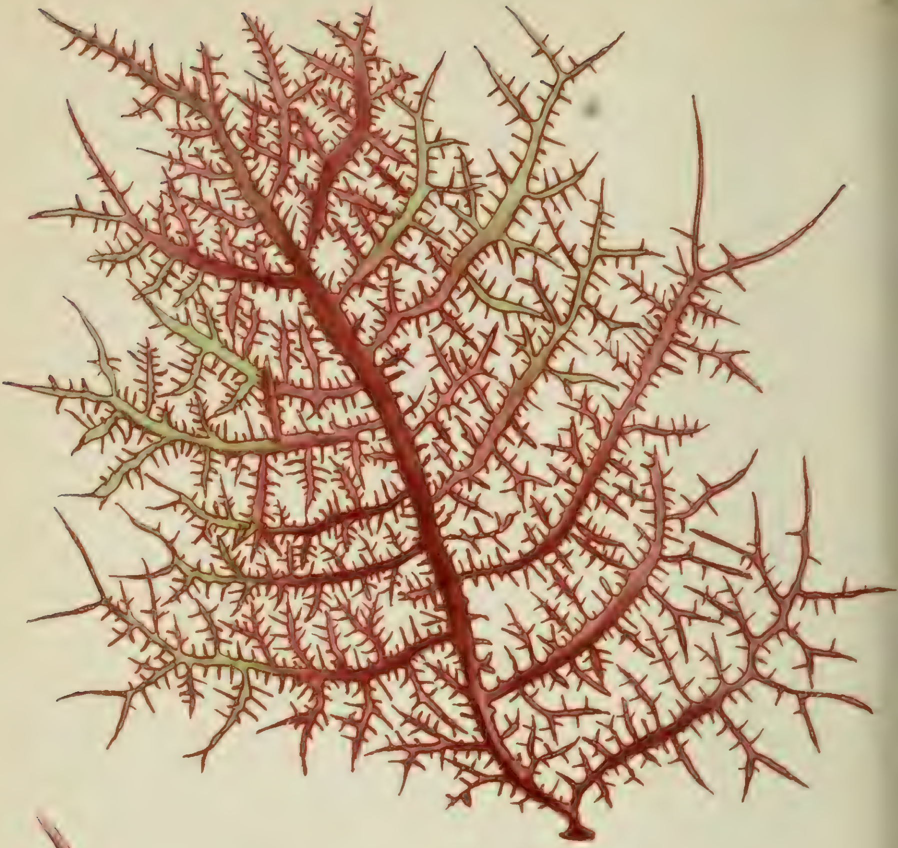
Plate CCLXVI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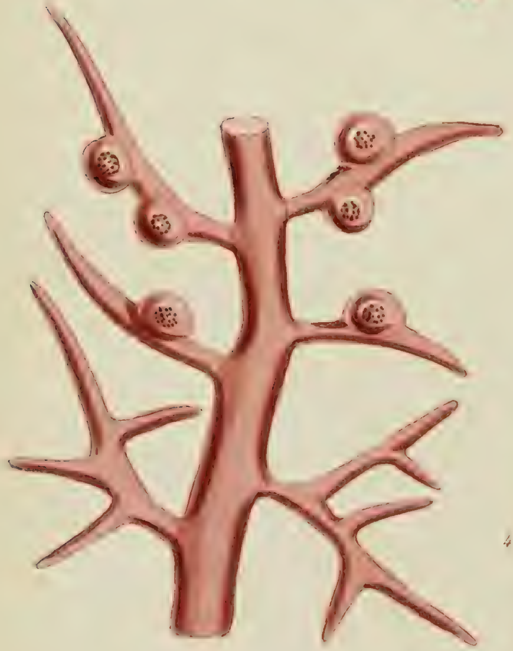
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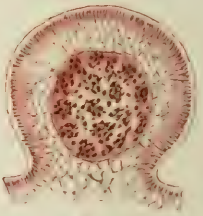
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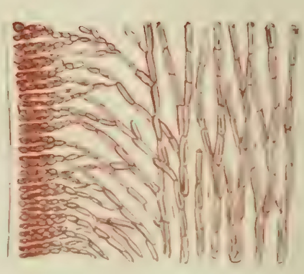
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W.H.H. del et lith.

R.B. & R.i

Plate CCLXVI.

GIGARTINA TEEDII, *Lamour.*

Gen. Char. *Frond* cartilaginous, either filiform compressed or flat, irregularly divided, purplish-red; the axis or central substance composed of branching anastomosing longitudinal fibres; the periphery of dichotomous filaments, laxly set in pellucid jelly; their apices moniliform, strongly united together. *Fructification* double, on distinct plants; 1, external *tubercles,* containing, on a central placenta, dense clusters of *spores,* scattered among the filaments of the periphery. Gigartina (*Lamour.*),—from γιγαρτον, a *grape stone,* which the tubercles resemble.

Gigartina *Teedii*; frond cartilagineo-membranaceous, flaccid, flat, linear, acuminate, repeatedly pinnate; the pinnæ opposite or alternate, horizontally patent, distichous, set with horizontal, spine-like ramuli; coccidia globose, on the ramuli, sessile.

Gigartina Teedii, *Lamour. Ess.* p. 49. t. 4. f. 11. *Hook. Br. Fl.* vol. ii. p. 301. *Wyatt, Alg. Damn.* no. 27. *Harv. Man.* ed. 1. p. 76. *Endl. 3rd Suppl.* p. 42.

Chondracanthus Teedii, *Kütz. Phyc.* p. 399.

Rhodomenia Teedii, *Grev. Alg. Brit.* p. 96.

Sphærococcus Teedii, *Ag. Sp. Alg.* vol. i. p. 277. *Ag. Syst. Alg.* p. 225. *Grev. Crypt. Fl.* t. 356.

Fucus Teedii, *Roth, Cat. Bot.* vol. iii. p. 108. t. 4. *Turn. Hist. Fuc.* t. 208.

Hab. On rocks, at the extreme limit of low water. Perennial. Very rare. Elberry Cove, Torbay, *Mrs. Griffiths* (1811).

Geogr. Distr. Atlantic coasts of France, Spain, and Portugal. Abundant in the Mediterranean.

Descr. *Root* a flattened disc. *Fronds* numerous from the same base, densely tufted, from three to six inches long, distichous, excessively branched in a more or less regularly pinnate manner, all the divisions horizontally patent. The main stems are from one to two, or, in very luxuriant specimens, three or four lines in breadth in the middle, and taper towards both ends, being attenuated upwards into a long slender point. They are either simple or forked, or irregularly cloven, flexuous, and closely beset with lateral branches which are simply, doubly, or trebly pinnate, and always beset with short, spine-like, horizontally patent ramuli. Different specimens vary much in the amount of branching, and in the breadth of the frond. *Fructification* has not been found in this country. The favellidia are enclosed in tubercles as large as poppy seed, plentifully scattered over the sides of the ramuli, and partially immersed in them. *Colour,* when quite recent, a dull brownish red; but in fresh water and in decay the frond assumes various tints of red and yellow, and finally becomes verdigris green. *Substance* between cartilaginous and membranaceous, soft and flexible, becoming rather horny when dry. In drying the frond shrinks considerably, and scarcely adheres to paper.

This is one of the rarest and most interesting of the British Sea-weeds. It was first found in England by Mrs. Griffiths, in the year 1811, on a small rock in Elberry Cove, growing in scattered tufts on spots left bare at the extreme limit of low water, of spring tides; and on this rock it continues to grow, and may generally be found in greater or less perfection every summer. In warm summers the plants are larger, more branching, and with broader membranes, and the tufts more numerous. Fructification has never been observed in this locality, and perhaps this is the cause why the plant appears never to have extended itself. On the opposite coast of Normandy, and southwards along the French coast, it is much more abundant, annually producing fruit; and in the Mediterranean *G. Teedii* is a very common plant. With us it seems to have reached nearly its extreme northern limit.

This plant is closely allied to *G. Chamiseoi*, of Peru, and *G. Chauvini*, of extra-tropical South America, from some varieties of which it is not always easy to separate it. In Britain it may be confounded with some states of *Gelidium corneum;* but the substance is much softer, and the structure, as seen in thin slices placed under a microscope, extremely different.

Fig. 1. Gigartina Teedii:—*of the natural size.* 2. Part of a fertile frond (from a foreign specimen) with tubercles in the ramuli. 3. Section of a tubercle. 4. Longitudinal section of the frond:—*all magnified in a greater or less degree.*

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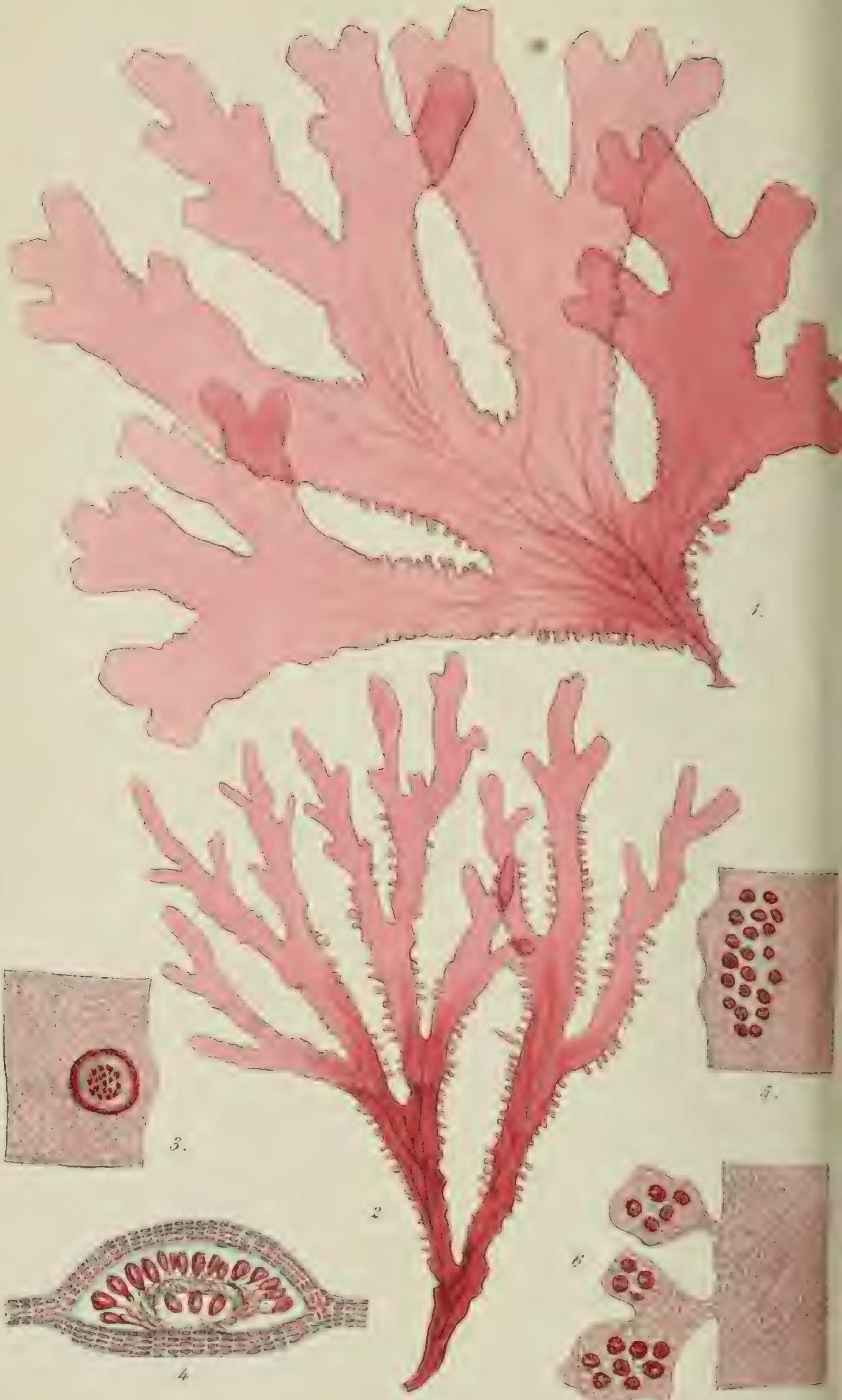
Plate CCLXV



W.H.H. del et lith.

I. E. & S. imp

PLATE CCLXVII.

NITOPHYLLUM LACERATUM, *Grev.*

GEN. CHAR. *Frond* membranaceous, reticulated, rose-red (rarely purplish), irregularly cleft, veinless, or furnished with irregular veins towards the base. *Fructification* two-fold, on distinct plants; 1, convex *tubercles* (*coccidia*) immersed in the frond, and containing a mass of spores; 2, *tetraspores* grouped into definite *sori*, or spots variously scattered over the frond. NITOPHYLLUM (*Grev.*), corruptly formed from *nitor, brilliancy,* and φύλλον, a *leaf.*

NITOPHYLLUM *laceratum*; frond sessile or shortly stipitate, much branched dichotomously, traversed by numerous branching and anastomosing nerves; segments linear, variously cleft and lobed, waved at the margin, obtuse; spots of tetraspores oblong, either marginal or borne on distinct, leafy processes of the margin.

NITOPHYLLUM laceratum, *Grev. Alg. Brit.* p. 83. *Hook. Brit. Fl.* vol. ii. p. 288. *Wyatt, Alg. Danm.* No. 107. *Harv. in Mack. Fl. Hib.* part 3. *Harv. Man. Ed.* 1. p. 59.

CRYPTOPLEURA lacerata, *Kütz. Phyc. Gen.* t. 68. vol. iii. p. 444. *Sp. Alg.* p. 870.

AGLAIOPHYLLUM laceratum, *Mont. Fl. Canar.* p. 150. *Endl. 3rd Suppl.* p. 52.

DELESSERIA lacerata, *Ag. Sp. Alg.* vol. i. p. 184. *Ag. Syst.* p. 251. *Grev. Fl. Edin.* p. 293.

WORMSKIOLDIA lacera, *Spreng. Syst. Veg.* vol. iv. p. 332.

CHONDRUS laceratus, *Lyngb. Hyd. Dan.* p. 18.

FUCUS laceratus, *Gmel. Hist.* p. 179. t. 21. f. 4. *Good and Woodw. Linn. Trans.* vol. iii. p. 155. *Stack. Ner. Brit.* p. 77. t. 13. *Turn. Syn.* p. 154. *Turn. Hist.* t. 68. *E. Bot.* t. 1067.

FUCUS crispatus, *Huds. Fl. Alg.* p. 58. *Linn. Syst. Nat.* p. 1718. *Esper, Ic. Fuc.* vol. i. p. 130. t. 90.

FUCUS endiviæfolius, *Lightf. Fl. Scot.* p. 948. t. 32.

HAB. On rocks and on the stems of *Laminaria digitata,* near low-water mark and at a greater depth. Annual. Summer. Common on the shores of the British Islands.

GEOGR. DISTR. Atlantic Coasts of Europe and North America.

DESCR. *Root* a small disc, often throwing out creeping fibres. *Fronds* sessile, or with a very short, cartilaginous stem, much divided, four to six or eight inches in length, and as much in expansion, the laciniæ varying in breadth from a quarter of an inch to upwards of an inch. The division of the frond is usually dichotomous, with many irregularities; the laciniæ are linear, or somewhat cuneiform, lobed and dentate, and often curled at the margin, very obtuse, simple or repeatedly forked. The lower part of the membrane is always traversed by slender, branching and anastomosing, tolerably distinct veins, which in some specimens extend and ramify through the upper part of the frond also: these are rarely indistinct, and are often very well defined. The axils are patent, the apices spreading widely. A variety is common in which the lateral smaller lobes of the frond hook backwards and coil round any neighbouring plant. *Coccidia* depressed, spheroidal, generally marginal or in marginal processes, containing, on a central placenta, numerous chained spores. *Spots* of tetraspores minute, oblong, confined to a line immediately within the margin, or else placed in little leafy processes which fringe the principal laciniæ of the frond. *Substance* delicately membranaceous, and very thin, but somewhat tough, elastic, and not adhering strongly to paper. *Colour* a purplish or brownish full red, reflecting glaucous tints when growing.

This is the most generally dispersed species of *Nitophyllum*, and the one most usually met with within tide marks. It frequently is found fringing the steep and shaded sides of deep rocky pools, when protected from the sun by overhanging *Fuci*; but its favourite place of growth seems to be on the stems of the larger oar-weeds. The frond varies much in breadth in different specimens, as may be seen by our figure, which, however, by no means represents the extreme forms. Some specimens are so broad and so little divided that they closely approach *N. Gmelini* in aspect, especially when dried; but the substance and colour of the two plants are essentially different, and when seen growing it is impossible to mistake one for the other. A very singular variety of *N. laceratum* is frequently seen between tidemarks, attaching itself by hooked lobes to neighbouring small algæ, and sometimes so intricately interwoven with their stems that it cannot be extricated without tearing. In this the frond is very narrow, of a brighter colour than usual, and almost every lobe converted into a strong recurved hook.

I have frequently observed spores to be developed within the substance of the placenta, as well as on its outer surface. Our figure (fig. 4) represents them in both positions, as seen in a vertical section of the conceptacle.

Fig. 1. NITOPHYLLUM LACERATUM; a broad variety. 2. A narrow variety, with marginal processes:—*both of the natural size.* 3. Small portion of the membrane with a marginal coccidium. 4. Section of the coccidium. 5. Marginal spot of tetraspores. 6. Marginal processes containing spots of tetraspores:—*all magnified.*

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Plate CCLXVI

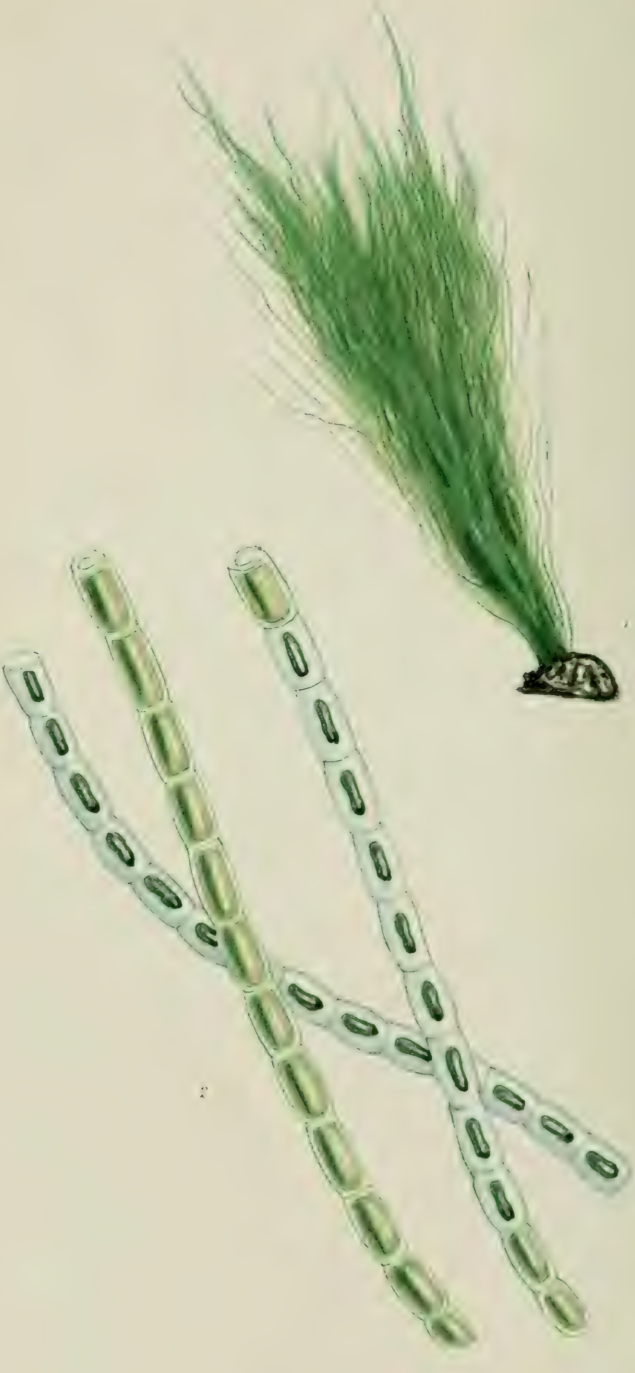

PLATE CCLXVIII.

CONFERVA BANGIOIDES, *Harv.*

GEN. CHAR. *Filaments* green, jointed, attached or floating, unbranched. *Fruit,* aggregated granules, or zoospores, contained in the articulations, having, at some period, a proper ciliary motion.—CONFERVA (*Plin.*), from *conferruminare,* to consolidate; because some of the species were used by the ancients in cases of fractured bones.

CONFERVA *bangioides*; filaments attached, elongated, very slender, soft and lubricous, wavy; articulations about twice as long as broad, containing, at maturity, a compact dark green mass; dissepiments broad, pellucid.

CONFERVA bangioides, *Harv. Man. Ed.* 1. p. 131. *Ed.* 2. p.

HORMOTRICHUM bangioides, *Kütz. Sp. Alg.* p. 383.

APLONEMA bangioides, *Hass. Fr. Alg.* p. 224.

HAB. On rocks, &c., near low-water mark. Breakwater at Plymouth, *Mr. Blatch.* Torquay, *Mrs. Griffiths.* Port Ballantrae, *Mr. Moore.* Ballycotton, *Miss Ball.*

GEOGR. DISTR. Not noticed out of Britain.

DESCR. *Filaments* from three to six inches in length, capillary, densely tufted, or spreading in large patches, which are dark green and glossy to the eye. Each filament is of equal diameter throughout, but there is much difference between the relative diameters of filaments from the same tuft. The articulations are about twice as long as broad, slightly contracted at the dissepiments, and filled with a dense herbaceous green endochrome, leaving a pellucid border all round. In an advanced stage of growth the endochrome contracts and condenses into a dark-coloured, oblong *spore,* which remains in the centre of the articulation, until, on the breaking up of a plant, it is liberated. *Substance* lubricous, closely adhering to paper in drying.

The species here figured is, in many respects, similar to *C. Youngana,* but is a larger species. From most others it may be known by its very lubricous and glossy tufts and soft feel. Except in colour there is much outward resemblance to *Bangia fuscopurpurea,* though under the microscope no two plants need be more unlike. When the plant first makes its appearance the colouring substance nearly fills the cell, and is of a pale colour, but gradually it condenses into a small, subcylindrical and dark-coloured spore in the centre.

The first specimens I received of this plant were sent to me by Mrs. Griffiths, to whom belongs the merit of having determined its characters correctly. It has subsequently been found in two stations in Ireland, but must still be regarded as one of our rarer species.

Fig. 1. Tuft of Conferva bangioides :—*the natural size.* 2. Portions of filaments of different ages :—*highly magnified.*

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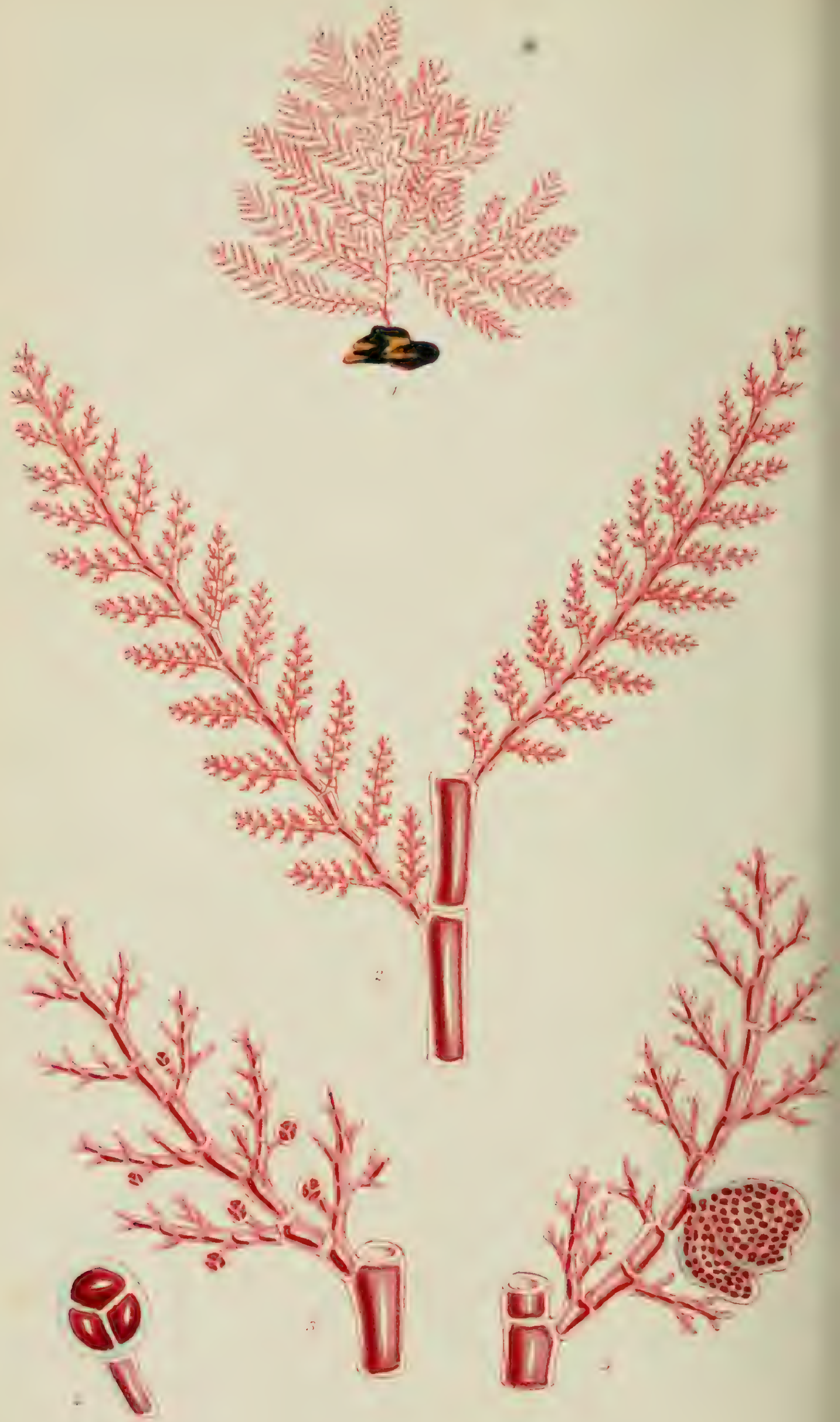

W. H. H. del et lith.

PLATE CCLXIX.

CALLITHAMNION THUYOIDEUM, *Ag.*

GEN. CHAR. *Frond* rosy or brownish red, filamentous; stem either opake and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds, on distinct plants; 1, external *tetraspores,* scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed berry-like receptacles *(favellæ)* seated on the main branches, and containing numerous angular spores. CALLITHAMNION (*Lyngb.*), from *κάλλος, beauty,* and *θαμνίον, a little shrub.*

CALLITHAMNION *thuyoideum*; stem capillary, undivided, set with alternate, distichous, repeatedly pinnate branches, with a narrow lanceolate outline; branches furnished with bipinnate or tripinnate plumules; articulations of the branches 2–6 times, of the pinnules about twice as long as broad; tetraspores borne on the tips of the ultimate pinnules.

CALLITHAMNION thuyoideum, *Harv. in Hook. Br. Fl.* vol. ii. p. 346. *Harv. Man.* ed. 1. p. 111.

CALLITHAMNION thuyoides, *Ag. Sp. Alg.* vol. ii. p. 172. *Endl. 3rd. Suppl.* p. 34. *Kütz. Sp. Alg.* p. 645.

CALLITHAMNION tripinnatum, *Harv. in Hook. Br. Fl.* vol. ii. p. 346 (*not of* Agardh). *Wyatt, Alg. Danm.* no. 186.

CONFERVA thuyoides, *E. Bot.* t. 2205.

HAB. On rocks, near low-water mark, rare. Annual. Spring and Summer. Yarmouth, *Mr. Borrer.* Plymouth, *Mr. Icona,* &c. Pier, Torquay, *Mrs. Griffiths.* Falmouth, *Miss Warren.* Ilfracombe; and Bracelet Bay, Swansea, *Mr. Ralfs.* Wicklow, *W.H.H.* Portaferry, *Mr. W. Thompson.* Roundstone, *Mr. Mc.Calla.*

GEOGR. DISTR. British Islands, and Atlantic coast of France.

DESCR. *Root* a minute disc. *Fronds* one to three inches long, densely tufted, perfectly distichous, with an ovate or flabellate outline. *Stem* mostly undivided, closely pinnated through its whole length with alternate, very patent branches, the lowest of which are longest, the rest gradually diminishing to the apex. These primary branches have a lanceolate outline, and are, with great regularity, pinnated with linear-lanceolate plumules, one rising from every articulation, and turned alternately to the right or left; the lowest plumules very short, the upper gradually longer and more compound, to the middle of the branch, thence gradually shortening towards its apex. *Plumules* bi- tripinnate, resembling the branches in miniature; the first plumule always given off from the upper side of the rachis. *Articulations* of the stem and branches very variable in length, commonly from four to six times as long as broad; but sometimes very short, with swollen dissepiments :—those of the ramuli uniformly about twice as long as broad. *Favellæ* solitary or binate, bursting from the rachis of the plumules, variously lobed. *Tetraspores* minute, globose, terminal on the ultimate ramuli. *Colour* a rosy pink, or brownish red. *Substance* delicately membranaceous, soft and flaccid, most closely adhering to paper.

* * *

One of the most *concinnate* of the *Callithamnia*, elegant in all its minute parts, and strictly neat in its mode of growth. In essential character it closely approaches *C. gracillimum*, from which it is more to be distinguished by habit than by any very definite character. *C. gracillimum* is a larger and more tufted plant, more irregular in ramification, with longer and more indefinite plumules, varying much in the composition of its ramuli. Our present plant is rather robust, with an evident central stem and lateral branches, spreading with much regularity; each branch, as well as the plumules with which it is feathered, being of a narrow lanceolate outline. The plumules are very generally triply pinnate. *Favellæ* are much less commonly found on this species than tetraspores, and generally burst from the sides, and not the apex of a branchlet.

Though found in many places, *C. thuyoideum* must be ranked among the rarer forms of the genus.

Fig. 1. CALLITHAMNION THUYOIDEUM ; a frond :—*of the natural size.* 2. Two articulations from a branch, each bearing a plumule. 3. Pinna from the same, with tetraspores. 4. A tetraspore. 5. Abbreviated plumule bearing a favella :—*all more or less highly magnified.*

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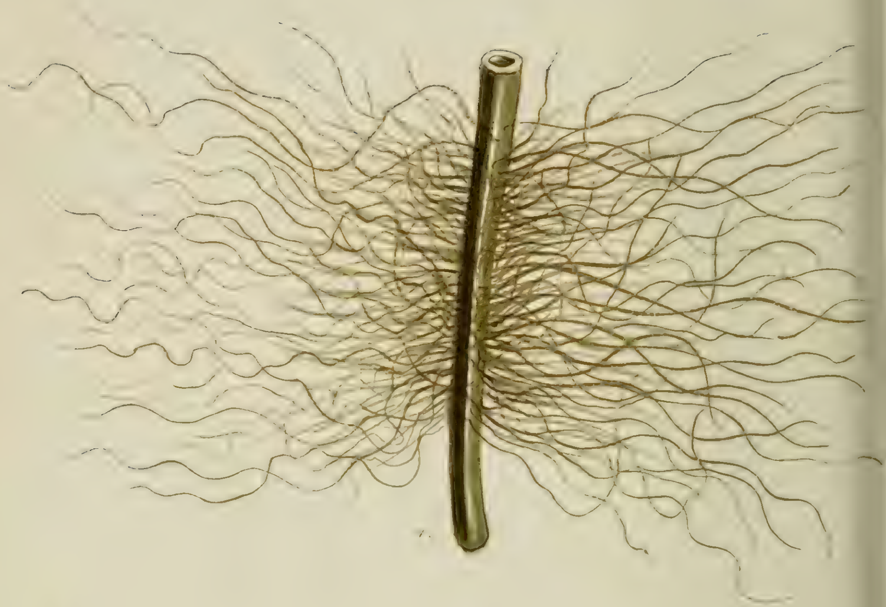
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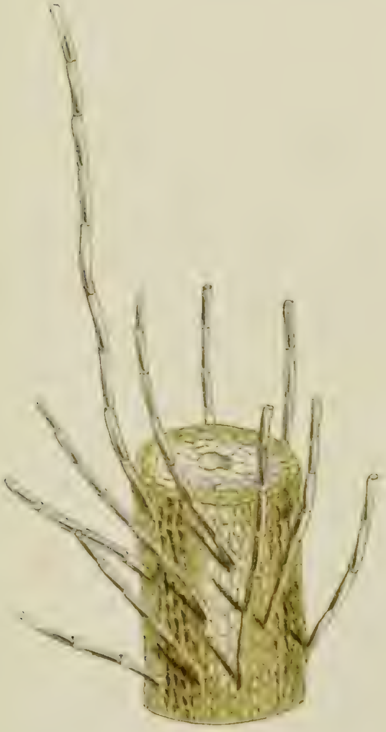
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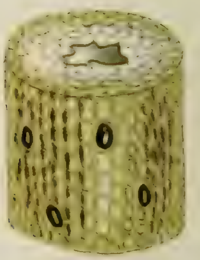
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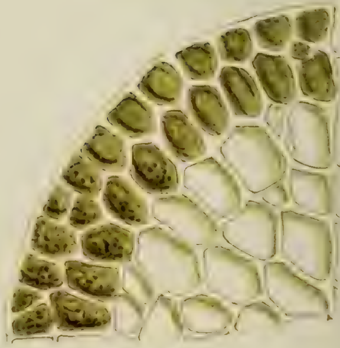
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PLATE CCLXX.

LITOSIPHON PUSILLUS, *Har.*

GEN. CHAR. *Frond* unbranched, cylindrical, cartilaginous, subsolid, at length tubular, composed of several rows of cells; the surface areolated. *Fructification*; solitary or aggregated naked spores, scattered irregularly over the surface of the frond. LITOSIPHON (*Harv.*), from λιτὸς, *slender* or *mean*, and σίφων, a *tube.*

LITOSIPHON *pusillus*; fronds tufted, thread-shaped, very long, equal in diameter throughout, reticulated, clothed with pellucid hairs; spores scattered.

LITOSIPHON pusillus, *Harv. Man. Ed.* vol. ii. p. 43.

CHLOROSIPHON pusillus, *Harv. in Phyc. Brit.* vol. i. p. 10. *Kütz. Sp. Alg.* p. 484.

ASPEROCOCCUS pusillus, *Carm. in Hook. Br. Fl.* vol. ii. p. 277. *Wyatt, Alg. Danm.* no. 58. *Harv. in Mack. Fl. Hib.* part 3. p. 175. *Harv. Man. Ed.* vol. i. p. 35. *J. Ag. Gen. et Sp. Alg.* vol. i. p. 78.

HAB. Parasitical on CHORDA FILUM. Annual. Summer. Common all round the coast.

GEOGR. DISTR. Shores of Europe.

DESCR. *Fronds* very densely tufted, clothing the plant on which they grow in continuous series for the space of several feet, completely concealing the surface and spreading on all sides equally; from two to four inches long, as thick as hog's bristle, straight, or more commonly variously waved or twisted. When young the whole frond is beset with slender, byssoid, articulated fibres, like those found in *Myriotrichia.* These gradually wear away, and then the fronds become more twisted and less lubricous. In young plants the frond is nearly solid, composed of several strata of cells, the inner ones of which are large and empty, the outer gradually smaller, and those of the two or three external rows (constituting the periphery) filled with granulated endochrome. The central cells first perish, and the plant becomes tubular, but the tube does not seem to have regularly defined limits. The surface under the microscope appears reticulated with quadrate cells, which are disposed in longitudinal lines. Among these cells one is here and there larger and more prominent than the rest, containing a darker-coloured endochrome: these are supposed to be the spores, and no other fructification has yet been observed. *Substance* somewhat cartilaginous, but soft and lubricous, closely adhering to paper. *Colour* at first a greenish, afterwards a brownish olive.

The old fronds of *Chorda filum* are frequently infested, towards the close of summer, with the parasite here figured, which changes them into shaggy ropes, soft and slippery to the touch.

When placed in water the innumerable thread-like fronds of the *Litosiphon* stand out from the *Chorda,* and spread in all directions round it, like the hairs of a bottle-brush.

This plant was orginally noticed by Capt. Carmichael, who called it *Asperococcus pusillus,* a name by which it has been generally known to succeeding botanists; although all have admitted that its claim to be regarded as a species of *Asperococcus* was, to say the least, very doubtful. In the list of species appended to the first volume of this work I called it *Chlorosiphon,* supposing that it must be the plant called by Kützing *Chlorosiphon Shuttleworthianus,* a name given by that author to an Alga gathered by Mr. Shuttleworth, on the West Coast of Ireland. I made this reference after reading the description in Kützing's work, but a subsequent communication with that author showed me that I had committed an error, for a specimen of Mr. Shuttleworth's Alga kindly sent to me by Professor Kützing, proves to be that young state of *Chorda lomentaria,* to which Carmichael gave the name *Asperococcus castaneus.* In these circumstances it becomes necessary to bestow a new name on the present plant, and I have chosen one applicable in a double sense.

As a genus it seems to come nearest to *Dictyosiphon,* from which it obviously differs in having an unbranched frond. I am not at all satisfied respecting the nature of the so-called spores, but no other fructification has yet been discovered.

Fig. 1. LITOSIPHON PUSILLUS, growing on *Chorda filum:—of the natural size.* 2. Part of a young frond. 3. Part of an older frond, with spores. 5. Quarter of a transverse section of the frond:—*more or less highly magnified.*

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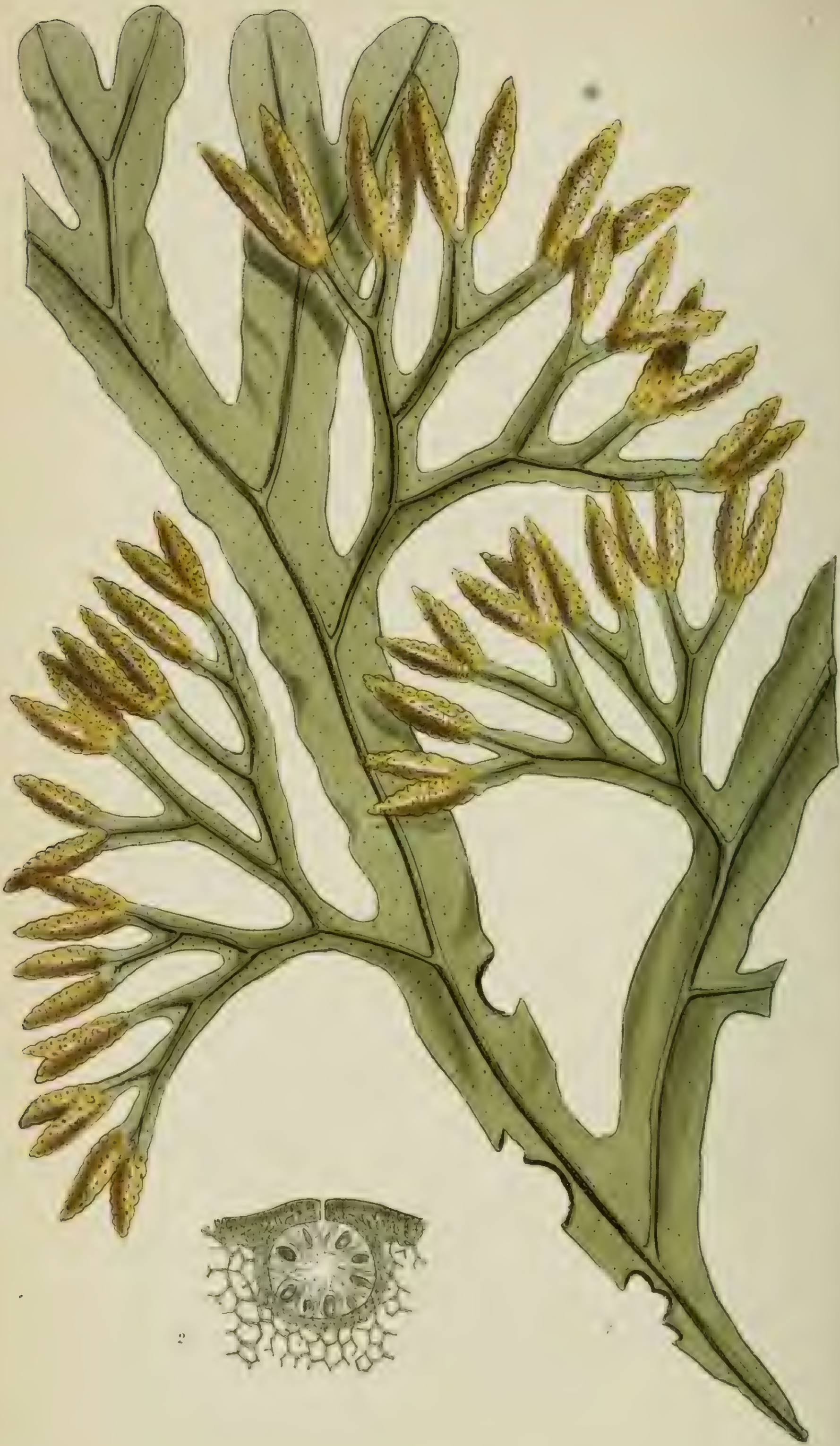

W. H. H. del. et lith.

R. B. & R. imp.

PLATE CCLXXI.

FUCUS CERANOIDES, *Linn.*

GEN. CHAR. *Frond* linear, either flat, compressed, or cylindrical, dichotomous (rarely pinnated), coriaceous. *Air-vessels,* when present, innate, simple. *Receptacles* either terminal or lateral, filled with mucus, traversed by a net-work of jointed fibres, pierced by numerous pores, which communicate with immersed, spherical *conceptacles,* containing parietal *spores,* or *antheridia,* or both. FUCUS (*L.*),—from φυκος, a *sea-weed.*

FUCUS *ceranoides*; frond plane, coriaceo-membranaceous, linear, subdichotomous, entire at the margin, midribbed, without vesicles; lateral branches narrower than the frond, repeatedly forked, level-topped, bearing fruit in their apices; receptacles spindle-shaped or bifid, acute.

FUCUS ceranoides, *Linn. Sp. Pl.* p. 1626. *Fl. Lapp.* p. 366. *Stack. Ner. Brit.* p. 71. t. 13. *Good. and Woodw. Linn. Trans.* vol. iii. p. 149. *Turn. Syn. Fuc.* vol. i. p. 136. *Turn. Hist.* t. 89. *Engl. Bot.* t. 2115. *Lyngb. Hyd. Dan.* p. 5. *Ag. Sp. Alg.* vol. i. p. 93. *Ag. Syst.* p. 277. *Grev. Alg. Brit.* p. 14. *Hook. Br. Fl.* vol. ii. p. 267. *Harv. in Mack. Fl. Hib.* part 3. p. 168. *Harv. Man.* ed. 2. p. 19. *Wyatt, Alg. Danm.* no. 154. *J. Ag. Gen. et Sp. Alg.* vol. i. p. 209. *Kütz. Phyc. Un.* p. 352. *Sp. Alg.* p. 590.

FUCUS distichus, *Esper, Ic. Fuc.* vol. ii. p. 62. t. 139. (*excl. syn.*)

HAB. On rocks and stones between tide-marks; seldom, except in places where fresh-water streams enter the sea; often in land-locked bays, and estuaries. Perennial. Spring and summer. Many places from Orkney to Cornwall.

GEOGR. DISTR. Atlantic shores of Europe, most frequent in the north. East coast of North America.

DESCR. *Root* a conical disc. *Frond* from one to two feet in length, much divided in a manner between pinnate and dichotomous, the original branching being dichotomous, and becoming more or less pinnated by the growth of lateral branches; consisting of a midribbed, linear, coriaceous, but thin, membrane, perfectly entire at the edges and destitute of vesicles. The main branches are from a quarter of an inch to half an inch or more in breadth, and always about twice as broad as the lateral branches: they are distantly and pretty regularly forked, with patent, obtuse or emarginate apices. The lateral branches are alternate, or sometimes secund, springing from the sides of the main division; they are narrow, closely and repeatedly forked, level-topped, and as it were corymbose. *Receptacles* small, terminating the lateral branches, fusiform or doubly fusiform and forked, swollen, gelatinous within, and acute or acuminate. *Substance* much thinner and more transparent than in *F. vesiculosus,* but nevertheless coriaceous. *Colour* a greenish or brownish olive.

This species, in many respects, resembles *F. vesiculosus*, with some varieties of which it has been occasionally confounded; but it has many characters by which it may at all times be known, independently of the absence of vesicles,—which character is too variable to be depended on, for in many forms of *F. vesiculosus* vesicles are wanting. *F. ceranoides* may be readily known by its much thinner and more transparent substance, and by containing a less quantity of saline matters; so that it dries much more rapidly when removed from the water, and requires far less steeping in fresh water when specimens are prepared for the Herbarium.

The usual habitat of this species is in places where a good deal of fresh water mixes with the sea; but it is by no means confined to such places. I have gathered specimens on exposed parts of the shore, where no fresh water flowed in. In the Loch of Stennis, Orkney, where the water is but faintly brackish, a very narrow variety is abundant. The greater the amount of saltness in the water the broader is the frond, but in no case is the substance so thick and leathery as in *F. vesiculosus*. The lateral fructification is very characteristic of this species, but is not essential, for there is a variety of *F. vesiculosus* figured by Dr. Greville having also lateral fruit.

Fig. 1. Fucus ceranoides:—*the natural size.* 2. Section of one of the *conceptacles*, from the receptacle, containing spores and paranemata:—*magnified.*

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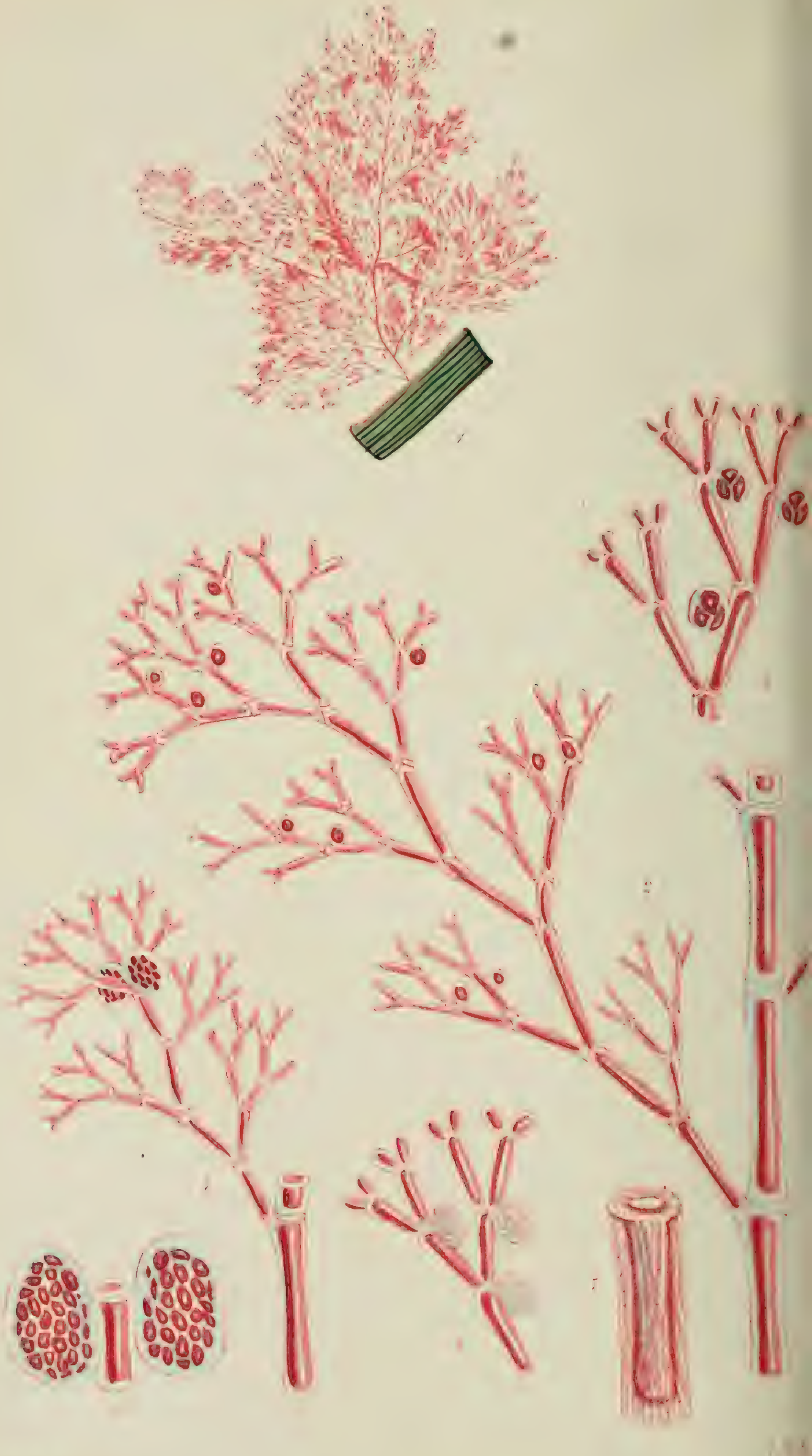

CALLITHAMNION CORYMBOSUM, *Ag.*

Plate CCLXXII.

Gen. Char. *Frond* rosy or brownish-red, filamentous; stem either opake and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds, on distinct plants: 1, external *tetraspores* scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like receptacles *(favellæ)*, seated on the main branches, and containing numerous angular spores. Callithamnion (*Lyngb.*),—from καλλος, *beauty,* and θαμνιον, a *little shrub.*

Callithamnion *corymbosum*; frond setaceous at the base, capillary and byssoid above, flaccid, gelatinous, excessively branched; secondary branches alternate, repeatedly dichotomous, subflabelliform, level-topped; ramuli many times forked, with patent axils; apices obtuse; articulations of the branches from eight to ten times as long as broad; tetraspores solitary, opposite the axils of the terminal forks, sessile, globose; favellæ binate, on truncated branches.

Callithamnion corymbosum, *Ag. Sp. Alg.* vol. ii. p. 165. *Harv. in Hook. Br. Fl.* vol. ii. p. 346. *Harv. in Mack. Fl. Hib.* part 3. p. 216. *Harv. Man.* p. 112. *Wyatt, Alg. Danm.* no. 92.

Callithamnion versicolor, *Ag. Sp. Alg.* vol. ii. p. 170. *Harv. in Hook. Br. Fl.* vol. ii. p. 346. *Harv. in Mack. Fl. Hib.* vol. ii. p. 165. *Harv. Man.* p. 112.

Phlebothamnion corymbosum, *Kütz. Phyc. Un.* p. 375. *Sp. Alg.* p. 657.

Phlebothamnion versicolor, *Kütz. Phyc. Un.* p. 375. *Sp. Alg.* p. 657.

Ceramium corymbosum, *Ag. Syn.* p. xxvii. *Ag. Syst.* p. 138.

Ceramium versicolor, *Ag. Syst.* p. 140.

Conferva corymbosa, *Eng. Bot.* t. 2352 (articulations too short).

Hab. On the leaves of *Zostera,* the fronds of various Algæ, and attached to rocks and stones, near low-water mark. Annual. Summer. Not uncommon, from Orkney to Cornwall.

Geogr. Distr. Atlantic and Mediterranean coasts of Europe. East coast of North America.

Descr. *Root* minute, giving rise to a dense tuft, composed of numerous fronds. *Stem* one to three inches long, the smaller specimens more slender than human hair, the larger as thick as hog's bristles at base, soon attenuated and reduced to a byssoid fineness in the upper part of the plant, variable in ramification; sometimes dichotomous from the very base, with no trace of a leading stem; sometimes (and more frequently) having a leading, subsimple stem set with closely placed, alternate branches. These branches, in full-grown plants, are excessively divided, having an ovate or fan-shaped outline, the branching being partly alternate, and partly dichotomous. The ultimate divisions, or ramuli, are more regularly forked, and level-topped, giving the tuft the appearance of being composed of innumerable minute corymbs, clothing the branches. *Articulations* of great length in all the main branches, destitute of veins, except towards the base of the stem and in very old fronds; those of the ultimate ramuli from three to four times as long as broad; all having a wide pellucid border surrounding the endochrome. *Favellæ* generally in pairs, terminating the secondary branches, and sometimes surrounded by a few forked ramuli. *Tetraspores* solitary, sessile, placed just below the forkings of the ultimate ramuli. *Colour* a fine rosy red, sometimes brownish, soon changing to orange in fresh water. *Substance* exceedingly tender, flaccid, and gelatinous, adhering most closely to paper in drying.

A very variable plant: so much so, that most authors regard as distinct species two forms which I here bring together. Hitherto in British works we have recognized the original *Cal. corymbosum* of Eng. Bot., and the *Cal. versicolor* of Agardh, the differences between which are said to be, that the former is much more slender than the latter, with longer joints, a less evident stem, and a less pinnated branching. Some specimens are, indeed, very slender, and dichotomously divided, and others are robust, with an undivided stem and lateral branches; but between the most extreme forms I have seen too many intermediate states to admit of my regarding them as belonging to more than one specific type. I have examined several authentic specimens of Agardh's *C. versicolor* and compared them with our British plant so called, and can detect no differences between them. I therefore no longer hesitate to unite that synonyme to *Cal. corymbosum.*

The nearest affinity of the present plant is with *C. spongiosum*, a species much more densely branched and bushy, of a browner colour, with a very robust stem and very short articulations; but, like the present, remarkable for dichotomous, level-topped ramuli, and tetraspores placed opposite the alternate forkings.

Fig. 1. CALLITHAMNION CORYMBOSUM, on a piece of *Zostera* leaf:—*the natural size.* 2. One of the ultimate forked branchlets, and some articulations of a secondary branch. 3. Ramuli with tetraspores. 4. A branch with favellæ. 5. The favellæ removed. 6. Ramulus with (so called) *antheridia.* 7. Veiny articulations from the base of the stem:—*all magnified.*

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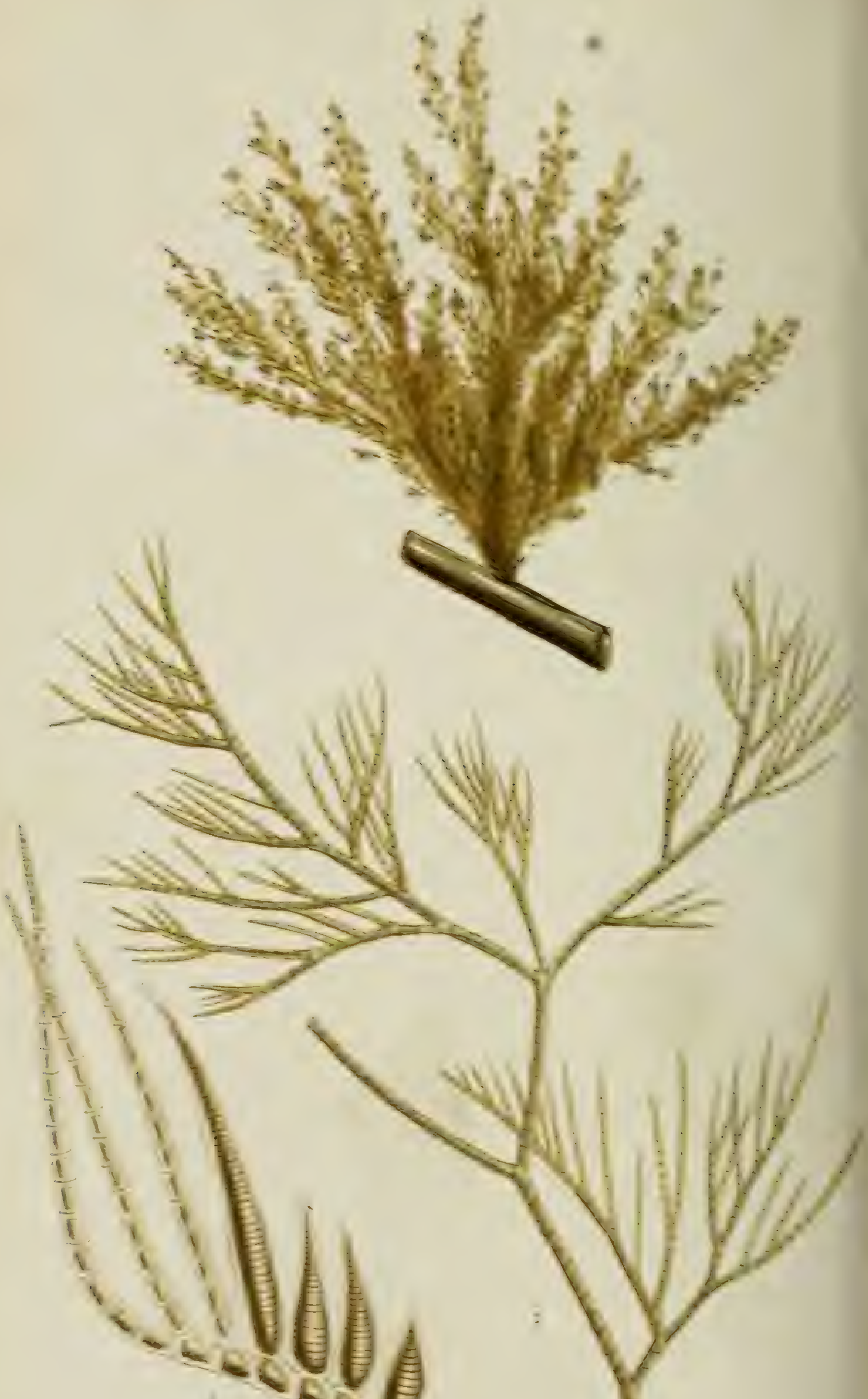

Plate CCLXXIII.

ECTOCARPUS FASCICULATUS, *Harv.*

Gen. Char. *Filaments* capillary, jointed, olivaceous or brown, flaccid, without longitudinal striæ. *Fruit* either spherical or elliptical, external or imbedded spores; or lanceolate, linear, or conical *silicules* (pod-like bodies); or granular masses formed in consecutive cells of the branches. Ectocarpus (*Lyngb.*),—from *εκτος, καρπος, external fruit.*

Ectocarpus *fasciculatus*; tufts olivaceous, dense; main filaments not much divided; the branches distant, set throughout with alternate or secund fascicles of subulate ramuli; the ramuli generally secund in each multifid fascicle; silicules sessile, secund, close together, ovate-acuminate or subulate.

Ectocarpus fasciculatus, *Harv. Man.* ed. 1. p. 40; ed. 2, p. 59. *Wyatt, Alg. Danm.* no. 202. *Kütz. Phyc. Gn.* p. 288. *Sp. Alg.* p. 451. *J. Agardh, Sp. Alg.* p. 22.

Hab. Between tide-marks, on the larger Algæ; most commonly on *Laminaria digitata.*

Geogr. Distr. Atlantic shores of Europe and North America.

Descr. *Filaments* densely tufted, from three to six or eight inches long, somewhat entangled together at the base into ropy bundles, free and feathery above, less branched than in most others of the genus, but nevertheless repeatedly divided. The ramification is irregular, between alternate and dichotomous, and the lesser branches especially are often flexuous or angularly bent. They are distantly branched, with patent axils, and furnished along their whole length with short, multifid ramuli, crowded together, not strictly *fasciculate*, it is true, but appearing so to the eye and to a moderately powerful lens. The ramuli are in truth secund, closely set, and often overlapping each other, a ramulus rising from each successive articulation of the penultimate branchlet. *Articulations* about twice as long as broad, containing a dense endochrome, with a wide border. *Silicules* very abundant, varying much in length, ovate-acuminate or subulate, very acute, densely striate transversely. *Colour* when young a deep, greenish olive, becoming pale and at length foxy in age. *Substance* membranaceous, soft, closely adhering to paper in drying when the plant is young—much less adhesive when old.

An exceedingly common species, easily recognized by the dense ramuli which appear to the naked eye to be tufted, but which are really only closely placed, and secund on the penultimate branchlets. The favourite habitat of *E. fasciculatus* is on the expanded fronds of *Lam. digitata,* where it often fringes the segments in continuous tufts, but it is not confined to that plant, but is commonly found also on *L. bulbosa* and on *Himanthalia lorea,* and others of the larger fucoid Algæ. When young and well grown it is a very handsome species, but soon becomes coarse and ropy, and towards the close of the season is very much infested with *Diatomaceous* parasites.

I have received numerous specimens from correspondents in North America, in which country this would appear to be one of the most abundant of the genus.

The silicules are generally strictly sessile, but vary in form from linear-subulate to nearly ovate-acute.

Fig. 1. Ectocarpus fasciculatus:—*the natural size.* 2. Branch with fasciculate ramuli. 3. Branchlet with silicules:—*both magnified.*

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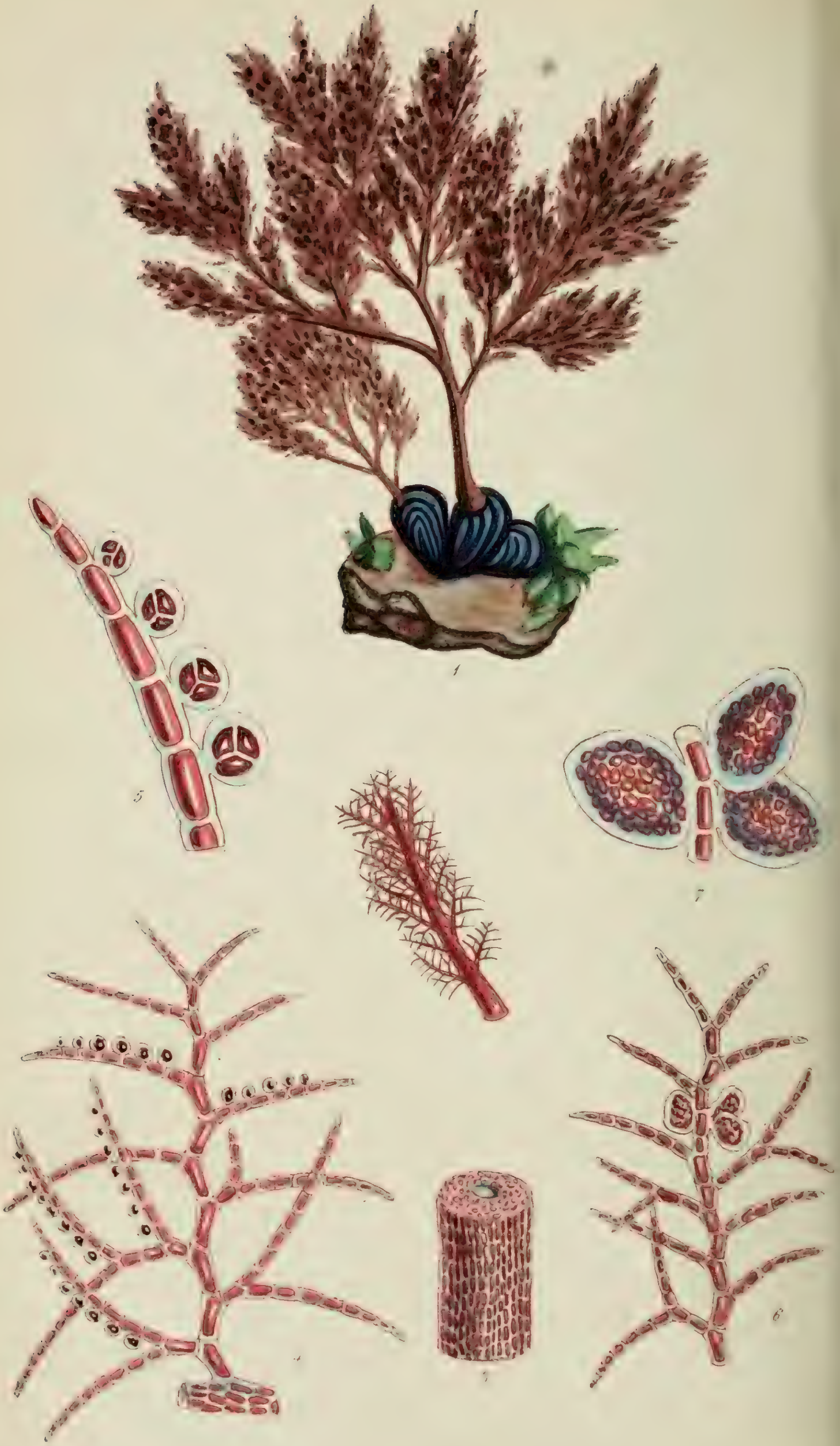

W. H. H. [illegible] [illegible]

PLATE CCLXXIV.

CALLITHAMNION ARBUSCULA, *Lyngb.*

GEN. CHAR. *Frond* rosy or brownish-red, filamentous; stem either opake and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds, on distinct plants; 1, external *tetraspores*, scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like receptacles *(favellæ)* seated on the main branches, and containing numerous angular spores. CALLITHAMNION (*Lyngb.*), from καλλος, *beauty*, and θαμνιον, *a little shrub.*

CALLITHAMNION *arbuscula*; stems naked below, inarticulate, robust, cartilaginous, the main divisions set with shorter branches, which are densely clothed on all sides with minute, imbricated, pinnated ramuli (plumules); ultimate pinnules simple or forked, recurved, acute, articulated, the articulations twice as long as broad; tetraspores globose, numerous, sessile on the upper edge of the pinnules.

CALLITHAMNION arbuscula, *Lyngb. Hyd. Dan.* p. 123. t. 38. *Harv. in Hook. Br. Fl.* vol. ii. p. 340. *Harv. in Mack. Fl. Hib.* part 3. p. 213. *Harv. Man.* ed. 1. p. 105.

PHLEBOTHAMNION arbuscula, *Kütz. Sp. Alg.* p. 656.

DASYA spongiosa, *Ag. Sp. Alg.* vol. ii. p. 121.

CONFERVA arbuscula, *R. Br.* — *Dillw.* t. 85. (excl. t. G.) *E. Bot.* t. 1916.

HAB. On rocks and mussel-shells, near low-water mark, usually in places left bare on the recess of the tide; also in tide-pools. Perennial. Summer and autumn. Abundant on the western shores of Scotland and Ireland; rare on the eastern. Frith of Forth, *Drs. Greville* and *Arnott.* Aberdeen, common, *Dr. Dickie.* Orkney, *Rev. J. H. Pollexfen.*

GEOGR. DISTR. The Ferroe Islands (and probably elsewhere in the Northern Sea).

DESCR. *Root* a fleshy, conical disc. *Fronds* several from the same base, from two to five or six inches high, as thick as small twine below, attenuated upwards, opake, and without visible articulation, much branched and shrub-like. *Stems* naked below, densely set with lateral branches above, and these furnished with other smaller ones, spreading on all sides and making a bushy or shrub-like head. The lesser branches, which are from a quarter to half an inch in length, are densely clothed with minute, closely imbricated plumules, a line or two in length, which make each little branch cylindrical, and, being very dense towards the tips, give the apices of the branches a strikingly blunt, corymbose aspect. The plumules have a flexuous rachis, set with alternate, simple, or once forked, horizontally patent or reflexed pinnules. *Favellæ* of small size, binate or clustered, springing from the rachis of the plumules. *Tetraspores* sessile, spherical, of small size, plentifully borne along the upper or inner edge of the ramuli, a tetraspore usually springing from every articulation. *Substance* in the stem and branches cartilaginous, flaccid in the ramuli. *Colour* a dark vinous red, inclining to purple, or sometimes to brown; staining fresh water carmine. Under the microscope the colour of the ramuli is a clear crimson lake.

The most robust and bushy of all the British *Callithamnia*, and therefore well named *Arbuscula*. The main stem is often upwards of a line in diameter, and divided into several stout branches, densely clothed with finely divided ramuli. The colour is always very dark, varying from brownish to a more or less vivid vinous purple. No species can well be confounded with the present, except, perhaps, very luxuriant specimens of *C. spongiosum*, but the microscopic characters of that species are extremely different. Formerly *Cal. arbuscula* was confounded with *Dasya arbuscula*, a mistake which could only arise from a very hasty examination of very imperfect specimens, for independently of generic character the plants are very different. In the *Dasya* the ramuli are dichotomous, and here they are pinnated, and far more densely crowded.

C. arbuscula is extremely abundant on the western coasts of Ireland and Scotland, and has been found on several parts of the east of Scotland; but is unknown in the east and south of Ireland, and has not, that I am aware of, been found in England. It delights on the most exposed rocks and the roughest water, and very commonly grows on the shells of *Mytilus rugosus*, in places where it is left dry for some hours each tide.

Fig. 1. CALLITHAMNION ARBUSCULA, growing on *Mytilus rugosus*:—*the natural size.* 2. Lesser branch clothed with plumules. 3. Segment of a small branch. 4. Plumule with tetraspores. 5. A ramulus and tetraspores from the same. 6. Plumule with favellæ. 7. Favellæ from the same:—*all magnified.*

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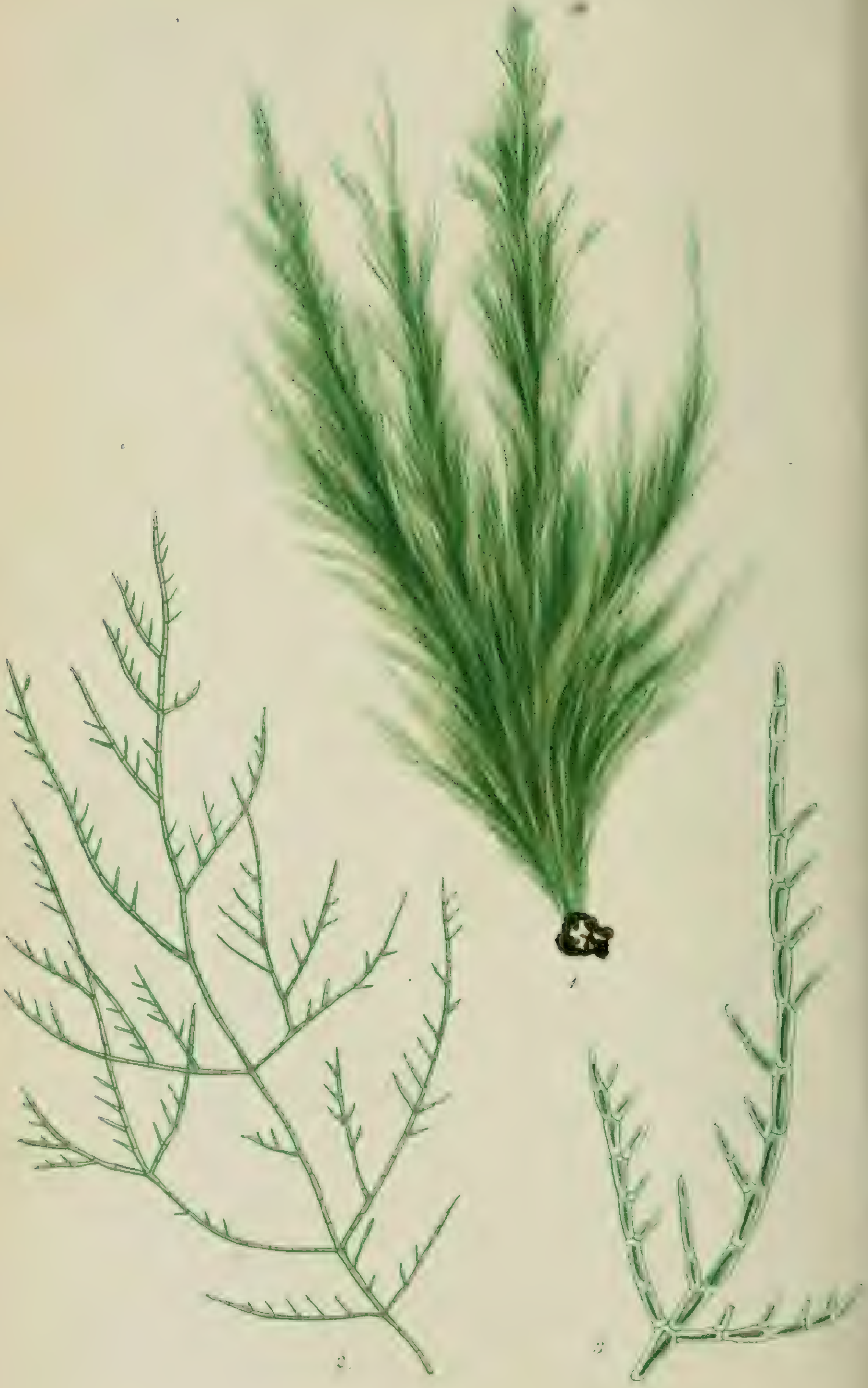
Plate CCLXXV.



W.H.H. del. et lith.

PLATE CCLXXV.

CLADOPHORA ALBIDA, *Kütz.*

GEN. CHAR. *Filaments* green, jointed, attached, uniform, branched. *Fruit,* aggregated granules or zoospores, contained in the articulations, having, at some period, a proper ciliary motion. CLADOPHORA (*Kütz.*), —from κλαδος, a *branch,* and φορεω, to *bear.*

CLADOPHORA *albida*; filaments exceedingly slender, flaccid, pale yellow green (whitish when dry), forming dense, silky, or somewhat spongy, soft, intricate tufts; branches crowded, irregular, the uppermost patent and mostly opposite; ramuli opposite or secund; articulations four or five times as long as broad.

CLADOPHORA albida, *Kütz. Phyc. Un.* p. 267. *Sp. Alg.* p. 400. *Hassall,* p. 224.

CONFERVA albida, *Huds. Fl. Ang.* p. 595. *Dillw. Conf.* p. 66. t. E. *E. Bot.* t. 2327. *Harv. in Hook. Br. Fl.* vol. ii. p. 358. *Harv. in Mack. Fl. Hib.* part 3. p. 229. *Harv. Man.* ed. 1. p. 138. *Wyatt, Alg. Danm.* no. 96.

HAB. On rocks and Algæ, between tide-marks, usually near low-water mark. Annual. Summer. Not uncommon on the southern shores of England, and the south and west of Ireland.

GEOGR. DISTR. Shores of Europe?

DESCR. *Tufts* six to twelve inches long, dense, soft and silky, retaining water like a sponge. *Filaments* inextricable, often rolled together below into thick rope-like bundles, mostly free and feathery above, exceedingly slender and excessively branched. It is impossible to follow the branching through the whole plant, but when small fragments broken from the lesser divisions are placed under the microscope, the branching seems partly opposite and partly secund: the penultimate branchlets are usually opposite and very patent; the ultimate ramuli generally short and secund. The upper branches are not much more slender than the lower, and the articulations, throughout the frond, are nearly uniformly from four to five times as long as broad. The colour is a pale, and peculiarly pleasant, yellowish green, fading in the herbarium to a dull whitish green without gloss. The substance is soft and flaccid, and the plant adheres pretty strongly to paper in drying.

A handsome species, and one of the earliest recognized, distinguished from most of our common kinds by the tenuity and softness of the filaments, their length, and the uniformly short articulations. It is most nearly related to *C. refracta,* with which Agardh unites it, but is a taller plant with less patent and less compound ramification, a softer substance, a paler colour, and altogether a different aspect. I confess, however, that it is difficult at all times to affix clear limits between these species. Neither are uncommon on rocky shores between tide-marks.

Fig. 1. CLADOPHORA ALBIDA:—*the natural size*. 2. Small part of a branch:—*magnified*. 3. Ramuli:—*more highly magnified*.

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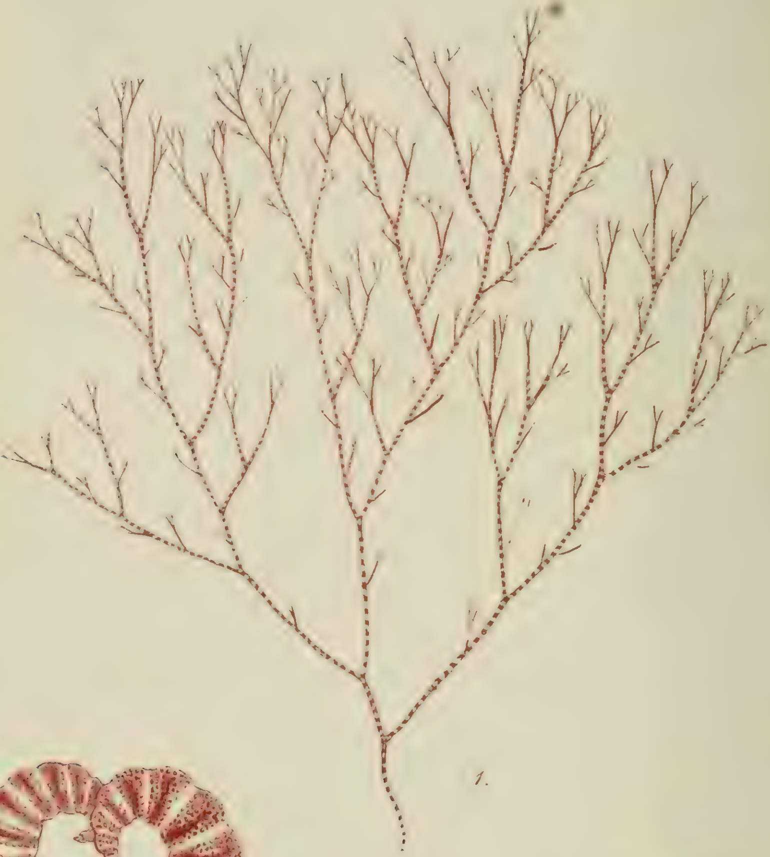
Plate CCLXXVI.



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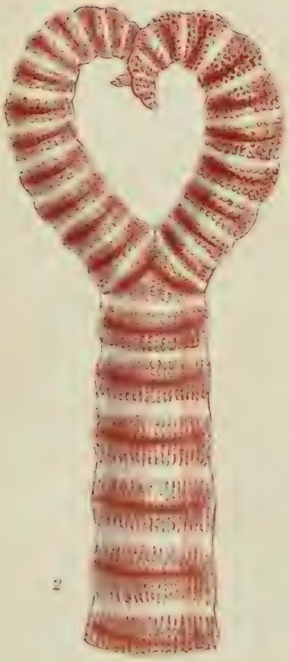

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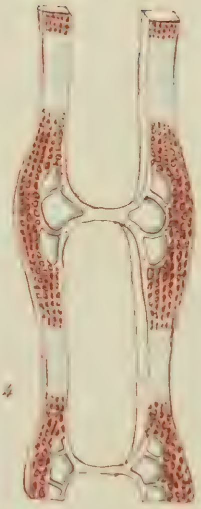

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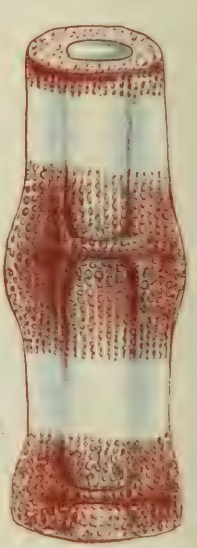

3.

W.H.H. del et lith. R.B. & P. imp.

PLATE CCLXXVI.

CERAMIUM DECURRENS, *Kütz.*

GEN. CHAR. *Frond* filiform, one-tubed, articulated; the dissepiments coated with a stratum of coloured cellules, which sometimes extend over the surface of the articulation. *Fructification* of two kinds, on distinct individuals: 1, *tetraspores* either immersed in the ramuli or more or less external; 2, sessile, roundish *receptacles (favellæ)* having a pellucid limbus, containing minute, angular spores, and subtended by one or more short, involucral ramuli. CERAMIUM (*Roth*),—from κεραμος, a *pitcher*; but the fruit is *not* pitcher-shaped.

CERAMIUM *decurrens*; frond robust, gradually attenuated upwards, dichotomous, with few lateral branchlets, the apices hooked inwards; articulations partially coated with coloured cellules, which extend from the dissepiment at each end, but leave a colourless, pellucid space in the centre of the articulation; lowermost articulations twice as long as broad, upper very short.

CERAMIUM decurrens. *Harv. Man.* ed. 2. p. 162.

HORMOCERAS decurrens (β. majus), *Kütz. in Linn.* vol. xv. p. 733. *Kütz. Phyc. Gen.* p. 379. *Sp. Alg.* p. 675.

HAB. On the smaller Algæ in tide-pools. Rare? Annual. August. On the Harbrich, at Torquay, *Mrs. Griffiths* (1844).

GEOGR. DISTR. Mediterranean Sea.

DESCR. *Frond* (in British specimens) six to eight inches long, as thick as hog's bristle below, gradually attenuated upwards, and capillary above, repeatedly and pretty regularly dichotomous, but scarcely fastigiate; the lower divisions of the frond distant, the upper more and more approximating. A few simple or forked short ramuli are scattered here and there along the branches. *Articulations* in the lower part of the frond about twice as long as broad, their upper and lower parts covered with coloured cellules, disposed in longitudinal lines; their middle colourless and bare. In the upper divisions of the frond and in the ramuli the articulations are very short, coated with cells except a narrow central pellucid band. The apices are strongly hooked inwards. I have not seen any fructification. *Colour* a full red, something like the colour of brick-dust, with a slightly purplish hue. *Substance* membranaceous, not very closely adhering to paper.

The original *C. decurrens* of Kützing is described as being "minute, scarcely an inch long, and capillary:"—the plant here figured is considered by that author, to whom I transmitted a specimen, to be a larger variety of the species, agreeing in all characters except in size with his specimens. I trust, therefore, that in adopting the specific name I am not committing an error, although, were I to form my judgment of *C. decurrens* on the diagnosis assigned to it by its founder, I should not have referred to it the specimens here figured.

Our *C. decurrens* seems to be almost exactly intermediate between *C. rubrum* and *C. diaphanum*. It agrees with the former in size, but differs in having a translucent space, destitute of coloured cells, in the middle of each internode. From *C. diaphanum* it differs chiefly in having the lines of coloured cells which clothe the nodes continued over a considerable space of the articulation, and thus, as it were, *decurrent* along the stem. The exact disposition of these cells, and the structure of the stem, is well seen when a longitudinal slice is taken, as at fig. 4. The minute coloured cells will then be found immersed in the transparent walls of the frond.

I have seen no other specimens than those found at Torquay, one of which is here figured. There is a variety of *C. rubrum* which I once confounded with *C. decurrens*, from its having a pale or transparent band in the centre of the internode;—but this variety, when examined more closely, will be found to have the whole of its walls traversed by strings of cells, but having those of the centre part colourless or pale.

Fig. 1. CERAMIUM DECURRENS, β. *majus*:—*the natural size.* 2. Apex of a branch. 3. Articulations from the middle of a branch. 4. Vertical section of the same:—*all highly magnified.*

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Plate CCLXXVII.

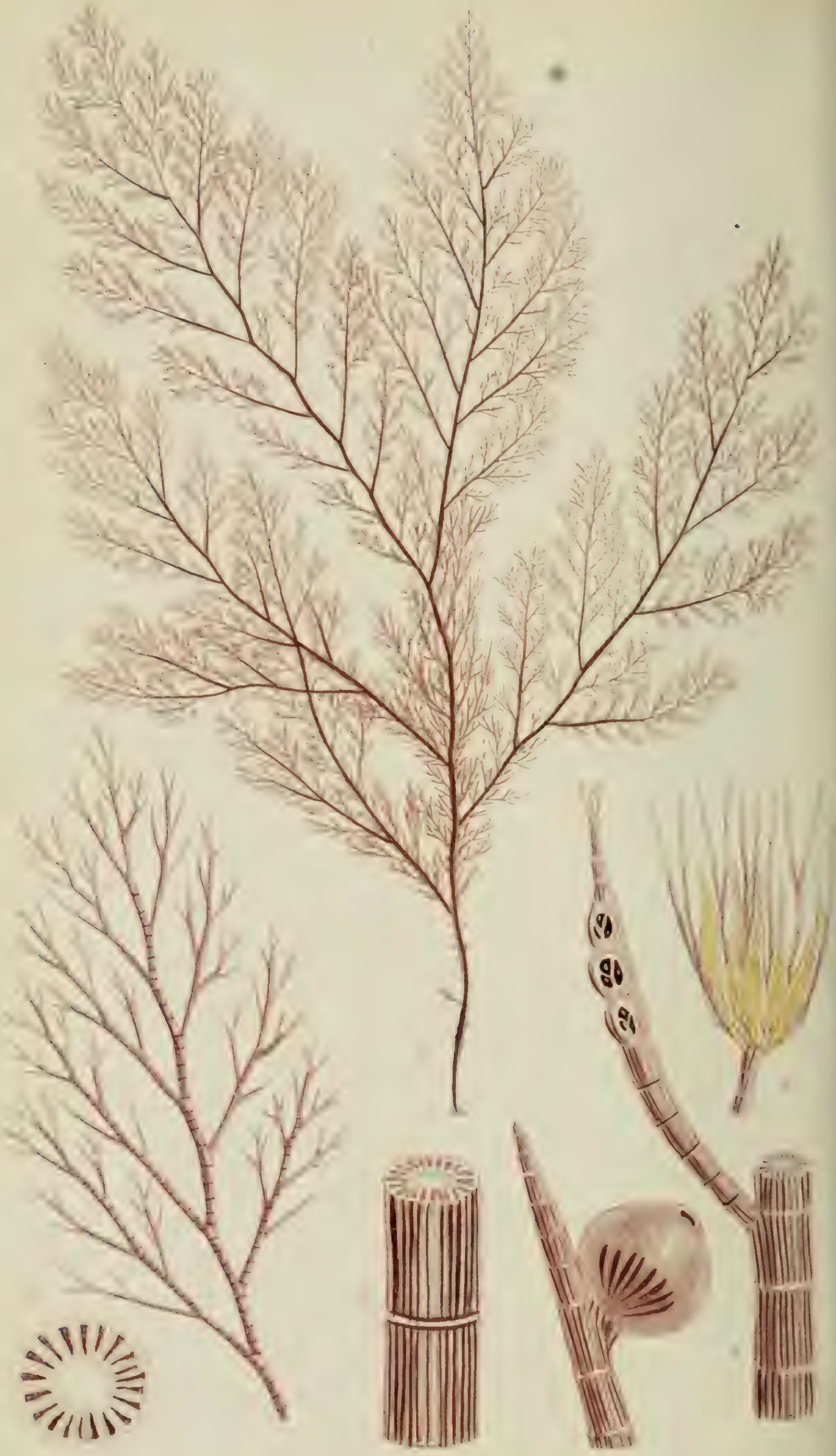

PLATE CCLXXVII.

POLYSIPHONIA NIGRESCENS, *Grev.*

GEN. CHAR. *Frond* filamentous, partially or generally articulate; joints longitudinally striate, composed of numerous radiating cells or tubes, disposed round a central cavity. *Fructification* twofold, on different individuals: 1, ovate *capsules* (*ceramidia*) furnished with a terminal pore, and containing a tuft of pear-shaped spores; 2, *tetraspores* imbedded in swollen branches. POLYSIPHONIA (*Grev.*), — from πολυς, *many*, and σιφων, a *tube*.

POLYSIPHONIA *nigrescens;* fronds robust, rigid, and generally rough with broken branches below, much branched and bushy above; the branches alternate, repeatedly divided in a pinnate manner; ramuli distant, elongated, awl-shaped, alternate, the upper ones sometimes having a few processes near the tips; lower articulations short, upper rather longer than broad; siphons about twenty, surrounding a large tube; ceramidia broadly ovate, sessile or nearly so.

POLYSIPHONIA nigrescens, *Harv. in Hook. Br. Fl.* vol. ii. p. 332. *Wyatt, Alg. Danm.* no. 135. *Harv. in Mack. Fl. Hib.* part 3. p. 208. *Harv. Man.* ed. 1. p. 88. ed. 2. p. 89. *Endl. 3rd Suppl.* p. 45. *Kütz. Phyc. Un.* p. 421. t. 50. iv. *Sp. Alg.* p. 813.

POLYSIPHONIA fucoides, *Grev. Fl. Edin.* p. 308.

HUTCHINSIA nigrescens, *Lyngb. Hyd. Dan.* p. 109. t. 33. *Ag. Syst.* p. 151. *Ag. Sp. Alg.* vol. ii. p. 69.

HUTCHINSIA fucoides, *Hook. Fl. Scot.* part 2. p. 87.

CONFERVA nigrescens, *Huds. Fl. Ang.* p. 602. (??) *Dillw. Conf.* no. 155. *Eng. Bot.* t. 1717.

CONFERVA fucoides, *Huds. Fl. Ang.* p. 603. *With.* vol. iv. p. 141. *Dillw. Conf.* t. 75. *Eng. Bot.* t. 1743.

HAB. On rocks, and stones, and attached to Algæ, &c., between tide-marks. Perennial? Summer. Abundant on the British shores.

GEOGR. DISTR. Atlantic shores of Europe and America. New Zealand.

DESCR. *Root* a small, discoid expansion. *Fronds* many from the same base, from three to twelve inches long or more, sometimes very slender and almost capillary, sometimes robust, twice as thick as hog's bristle, simple below, very much branched and bushy above. The ramification, like almost every other character of this variable plant, is subject to many anomalies. In what may be considered the typical form, the stem divides into several principal branches, and the frond when displayed is broadly flabelliform in outline. Each main branch is obovate, and closely pinnated with alternate, erecto-patent secondary branches of similar outline; and these latter are doubly pinnate. The ultimate pinnules are subulate, distantly placed, regularly alternate, rather erect, and either quite simple or having one or two thorn-like processes near the apex. In other varieties the decompound-pinnate character is less obvious; there is less distinction into a primary stem and branches, and all parts of the frond are more erect, sometimes being very erect. In other specimens the lateral pinnæ are short and nearly simple: and in a singular variety (possibly a species) found by Mrs. Griffiths, at Larderham, Torbay, every division of the plant is patent and divaricate, and the substance stiff and rigid. Late in the season the finer upper ramuli disappear; the frond becomes unsightly and distorted, and rough with the stumps of its broken ramuli. In this state it survives through the winter, and next spring produces a new and copious crop of branches. *Ceramidia* nearly sessile, broadly ovate. *Tetraspores* immersed in the tips of distorted ramuli. *Siphons* about twenty, narrow, surrounding a large cavity. *Colour* purple in the finer branches, very dark, and brownish below, rarely brown-red; darkening and almost blackening in drying. *Substance* in the stem rigid; in the ramuli soft, flaccid, and adhering, but not strongly, to paper.

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This species varies considerably in appearance according to the time of year at which the specimens are collected, the autumnal or winter individuals being coarse and bushy, with crowded ramuli, while those gathered in spring and summer are of the feathery character represented in our figure. Some are of a dark purple, and others are of a dull brown, or pale; but all become much darker and even black in drying. From all the British species of the section to which it belongs, *P. nigrescens* may be known by the distantly pinnated ramuli, the very large number of siphons, and the comparatively wide central tube. When bearing antheridia the tips of the branches are yellow.

I am unable to distinguish *P. atropurpurea* from a common form of the species.

Fig. 1. POLYSIPHONIA NIGRESCENS:—*the natural size.* 2. A small branch. 3. Apex of a ramulus with ceramidium. 4. Ramulus with tetraspores. 5. Antheridia. 6. Articulations of the stem. 7. Transverse section of the stem:—*all magnified.*
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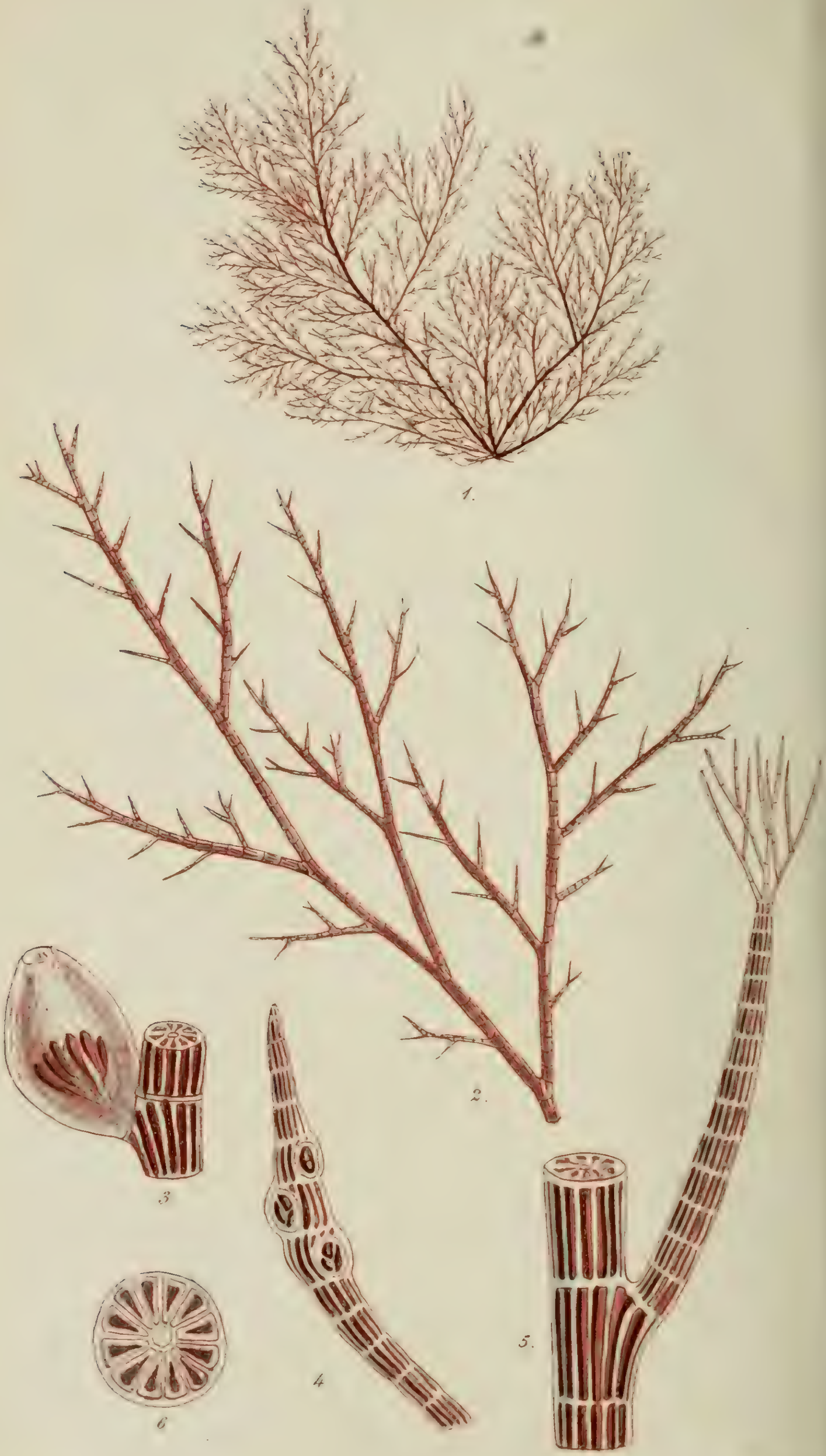
Plate CCLXXVII



W.H.H. del et lith.

R. B. & R.

PLATE CCLXXVIII.

POLYSIPHONIA SIMULANS, *Harv.*

GEN. CHAR. *Frond* filamentous, partially or generally articulate; joints longitudinally striate, composed of numerous radiating cells or tubes, disposed round a central cavity. *Fructification* twofold, on different individuals: 1, ovate *capsules* (*ceramidia*) furnished with a terminal pore, and containing a tuft of pear-shaped spores; 2, *tetraspores* imbedded in swollen branchlets. POLYSIPHONIA (*Grev.*),—from πολυς, *many*, and σιφων, a *tube*.

POLYSIPHONIA *simulans*; filaments slender, bushy, branched from the base; branches alternate, patent, repeatedly (but irregularly) pinnate; the penultimate branches long and simple, set with short, distant, spine-like ramuli; articulations of the branches once and half as long as broad, of the ramuli shorter, many-tubed; siphons about twelve; ceramidia globose or ovate.

POLYSIPHONIA simulans, *Harv. Man.* ed. 2. p. 89.

POLYSIPHONIA spinulosa, *Griff. in Harv. Man.* ed. 1. p. 87. (*not of Grev.*)

POLYSIPHONIA divergens, γ Grevilleana, *Kütz. Sp. Alg.* p. 822. (Torquay specimens.)

HAB. On rocks, &c., in tide-pools near low-water mark. Annual? Summer. Rare. Bathing Cove, Torquay and Torabbey Rocks, *Mrs. Griffiths*. Bovisand, *Rev. W. S. Hore*. Jersey, *Miss White* and *Miss Turner*. Valentia, Kerry, *W. H. H.* Skaill, Orkney, *Rev. J. H. Pollexfen*.

GEOGR. DISTR. Not noticed out of Britain.

DESCR. *Fronds* densely tufted, two or three inches high, branched from the base and bushy, setaceous below, capillary above, irregularly divided. *Branches* alternate, somewhat pinnate, not perfectly distichous, decompound, the divisions set with short, subulate, scattered, spine-like ramuli, and connected together by irregular spine-like processes, so that the lesser divisions are difficult to spread out. *Articulations* of the stem and branches about once and half as long as broad, of the ramuli very short, with pellucid dissepiments, multistriate; siphons about twelve, surrounding a small central tube. *Ceramidia* ovate, sessile, scattered on the smaller branches. *Tetraspores* immersed in slightly swollen ramuli. *Colour* a dull reddish-brown, or dark brown-red. *Substance* stiff and brittle, becoming flaccid in fresh water, and then adhering to paper.

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In the first edition of my "Manual," I fell into an error in confounding this species with *P. spinulosa* of Greville, a plant to
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which it bears only an outward resemblance, differing very essentially in microscopic characters. In the original *P. spinulosa* there are but *four* siphons surrounding the central cavity; here there are *twelve*. By comparing the figure now given, with that of *P. subulifera*, it will be seen that there is a much nearer relationship to that species than to any other British one, and except for some differences of habit, and minor differences in structure, the two might perhaps be brought together. Prof. J. Agardh, however, who saw specimens of our *P. simulans* during his visit to England, pronounced them distinct, an opinion also entertained by Mrs. Griffiths, and in which, though not without misgivings, I concur. As it is no longer possible to retain the name *spinulosa* for the plant here figured, I propose that of *simulans*, alluding to its deceptive character;—for it looks sometimes like *P. subulifera*, sometimes like *P. nigrescens*, and has been mistaken, as we have seen, for *P. spinulosa*.

It is one of our rarer species, although found in several distant localities.

Fig. 1. POLYSIPHONIA SIMULANS:—*the natural size.* 2. A small branch. 3. Ceramidium. 4. Ramulus with imbedded tetraspores. 5. Joints from the stem, and young ramulus with apical fibres. 6. Transverse section of the stem:—*all magnified.*

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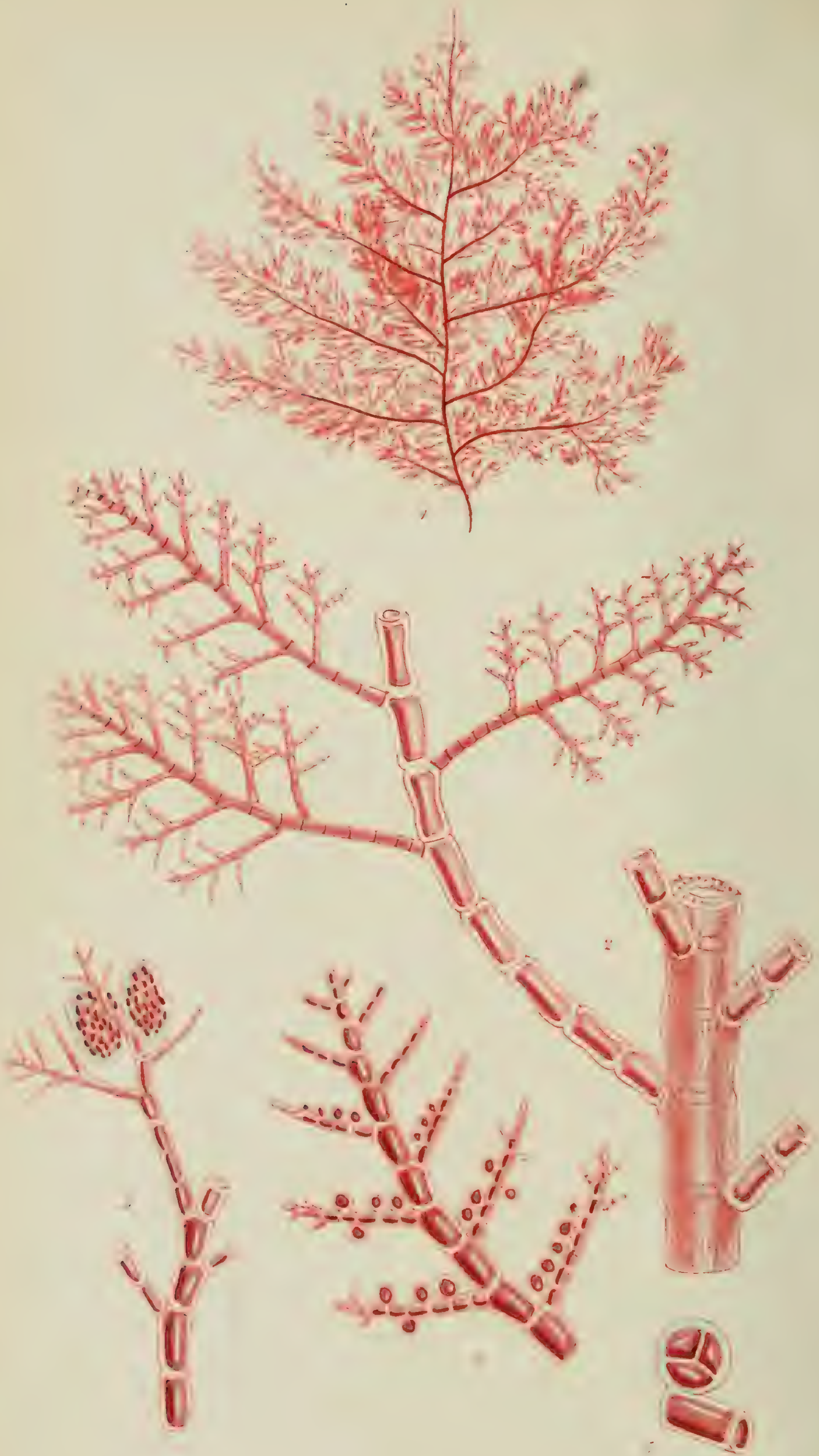

W.H.H. del. et lith.

PLATE CCLXXIX.

CALLITHAMNION HOOKERI, *Ag.*

GEN. CHAR. *Frond* rosy or brownish-red, filamentous; stem either opake and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds, on distinct plants: 1, external *tetraspores*, scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like receptacles *(favellæ)* seated on the main branches, and containing numerous angular spores. CALLITHAMNION (*Lyngb.*), from καλλος, *beauty*, and θαμνιον, *a little shrub.*

CALLITHAMNION *Hookeri*; stem setaceous, inarticulate or nearly opake, with traces of joints, simple, set with one or more series of alternate, spreading, flexuous branches, the smaller of which are articulated, and all densely plumulate; plumules patent, naked below, pinnate or subbipinnate above; the pinnæ or pinnules subhorizontal or divaricate, the lowest longest; articulations twice or thrice as long as broad; tetraspores numerous, sessile on the pinnules; favellæ terminal, binate.

CALLITHAMNION Hookeri, *Ag. Sp. Alg.* vol. ii. p. 179. *Harv. in Hook. Br. Fl.* vol. ii. p. 341. *Harv. Man.* ed. 1. p. 106.

CALLITHAMNION lanosum, *Harv. in Hook. Br. Fl.* vol. ii. p. 341. *Wyatt, Alg. Dan.* no. 139.

CALLITHAMNION spinosum, *Harv. in Hook. Br. Fl.* vol. ii. p. 345. *Harv. Man.* ed. 1. p. 111.

PHLEBOTHAMNION Hookeri, *Kütz. Phyc.* p. 375. *Sp. Alg.* p. 653.

PHLEBOTHAMNION spinosum, *Kütz. Sp. Alg.* p. 653.

CERAMIUM Hookeri, *Ag. Syn.* p. xxvii. *Hook. Fl. Scot.* part 2. p. 85. *Ag. Syst.* p. 138.

CONFERVA Hookeri, *Dillw. Conf.* t. 106.

HAB. On various Algæ between tide-marks, also on rocks near low water-mark, and at a greater depth. Annual. Summer. Dispersed along the British shores, from Orkney to Cornwall, and in Ireland; not uncommon.

GEOGR. DISTR. Atlantic shores of Europe: but rare.

DESCR. *Root* a minute disc. *Fronds* densely tufted, one to four inches in length, and as much in expansion, having a conical or pyramidal outline, the lower branches being longest, the rest gradually shorter upwards, not perfectly distichous, and sometimes densely bushy, with branches turned in every direction. *Stem* mostly undivided, as thick as a hog's bristle, opake and full of veins, or (in young specimens) obscurely marked with joints, closely set throughout with lateral, very patent branches, similar to the main stem.

These branches bear a second and third series; the lesser divisions being pinnated with alternate, ovate, patent, stipitate plumules. *Plumules* simply or doubly pinnate, the pinnules long and widely spreading, sometimes recurved. *Articulations* short in all parts where they are visible. *Tetraspores* numerous, spherical, lining the inner edge of the pinnules, one borne by every articulation. *Favellæ* binate, mostly terminal, on less regularly pinnate branches. *Colour* varying from a full purplish to a brownish red; sometimes pale pink, fading rapidly in fresh water to a dirty white. *Substance* flaccid, adhering to paper, and soon rotting if moistened after having been dried.

A common but very variable species, and yet not difficult to understand when a few leading features are kept in view. Its most striking characters are the opake stem and branches, the short articulations, and the very patent or divaricated ramuli, frequently pinnulated above. It verges on the one hand to *C. roseum*, and on the other to *C. Borreri* and to *C. polyspermum*, but is readily recognized from each of these by some one of its characters.

By the synonyms quoted, it will be seen that at one time I made *three* species of what I now regard as one: and if I had added a fourth (*C. affine*), I had perhaps acted discreetly—but I reserve that species for a future examination. Those who know the difficulty attending the determination of these plants, will best excuse these and similar mistakes.

C. Hookeri is named in honour of Sir Wm. J. Hooker, by whom it was first discovered, and communicated to Dillwyn as a new species.

Fig. 1. CALLITHAMNION HOOKERI:—*the natural size.* 2. Base of a smaller branch, bearing three plumules. 3. Small branch with a favella. 4. Part of a plumule, bearing tetraspores. 5. A tetraspore:—*all more or less magnified.*

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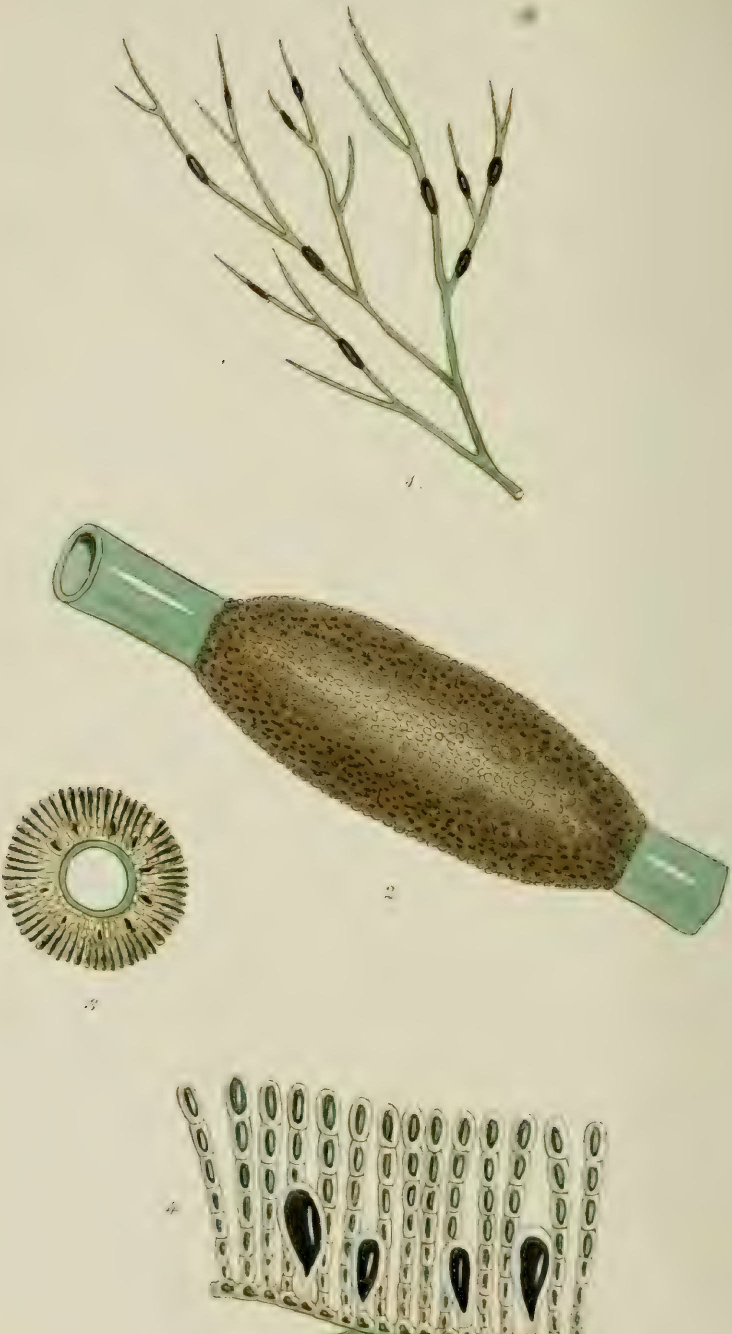

W. H. H. del. et lith. [illegible]

PLATE CCLXXX.

MYRIONEMA STRANGULANS, *Grev.*

GEN. CHAR. Minute *parasites,* consisting of a mass of short, erect, simple, jointed filaments, which spring from a thin expansion formed of decumbent, cohering filaments, spreading in patches on the surface of other Algæ. *Spores* oblong, affixed either to the erect, or to the decumbent filaments. MYRIONEMA (*Grev.*),—from μυριος, *numberless,* and νημα, a *thread.*

MYRIONEMA *strangulans*; patches convex, confluent, brown; the vertical filaments clavate, densely set; spores obovate, on short stalks, attached to the decumbent filaments.

MYRIONEMA strangulans, *Grev. Crypt. Fl.* t. 300. *Harv. in Hook. Br. Fl.* vol. ii. p. 391. *Harv. in Mack. Fl. Hib.* part 3. p. 223. *Harv. Man.* ed. 2. p. 51. *J. Ag. in Gen. and Sp. Alg.* vol. i. p. 48. *Kütz. Sp. Alg.* p. 540.

HAB. Parasitical on the fronds of various *Ulvæ* and *Enteromorphæ.* Annual. Summer and autumn. Common.

GEOGR. DISTR. Probably widely dispersed.

DESCR. The parasite first appears in the form of a dark brown stain, spotting the *Ulva* on which it grows, and at this stage consists of little more than an imperfect membrane composed of prostrate filaments. As it advances in growth the erect filaments are developed: the spots become convex, and gelatinous, and the plant is matured. It then, when growing on the cylindrical fronds of an *Enteromorpha,* completely invests the stem, forming a collar round it. Under the microscope, looking vertically on the parasite, the whole appears like a soft cushion, composed of innumerable brown dots set in a gelatinous matrix. These dots are the tips of the erect filaments, and the proper structure may be seen either by making a thin transverse slice, or by bruising the frond between two flat pieces of glass. The little plant will then be resolved into its component parts. *Spores* of large size, obovate, pedicellate, rising from the prostrate filaments, generally abundant. Articulations of the erect filaments about once and a half as long as broad, contracted at the joints, containing an olive endochrome.

In our first volume are figured (Plate XLI.) two species of *Myrionema,* a genus founded by Dr. Greville for the reception of the curious and beautiful little parasite here represented. *M. strangulans* abounds on all our coasts, and will always afford the possessor of a microscope an interesting subject for examination. The dark brown specks on the fronds of *Enteromorphæ* and *Ulvæ*, which look like incipient decay, are very often caused by the growth of our parasite, and their colour will direct the most unexamining eye to them. I have generally found the plant in a perfect state in summer and autumn, but specimens may be found at most seasons.

Fig. 1. Part of a frond of *Enteromorpha*, infested with MYRIONEMA STRANGULANS :—*the natural size.* 2. A frond of the *Myrionema*, seen vertically. 3. Transverse section of the same. 4. Filaments and spores :—*all more or less highly magnified.*

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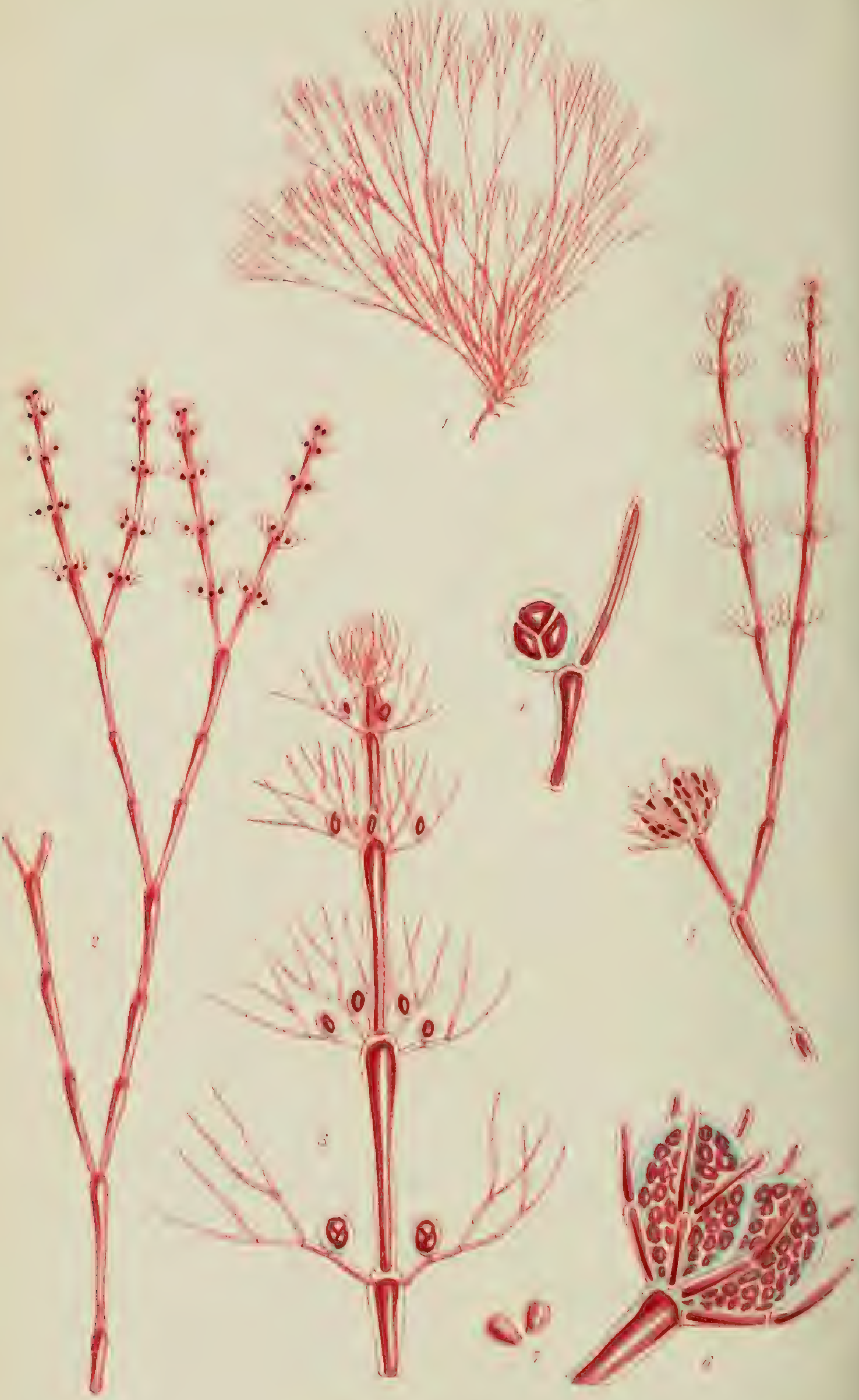
Plate CCLXXXI.



W.H.H. del et lith.

PLATE CCLXXXI.

GRIFFITHSIA BARBATA, *Ag.*

GEN. CHAR. *Frond* rose-red, filamentous; *filaments* jointed throughout, mostly dichotomous; ramuli single-tubed; dissepiments hyaline. *Fructification* of two kinds, on distinct individuals: 1, *tetraspores* affixed to whorled involucral ramuli: 2, gelatinous *receptacles* (*favellæ*), surrounded by an involucre, and containing a mass of minute angular spores. GRIFFITHSIA—so named by Agardh, in honour of Mrs. Griffiths of Torquay, the most distinguished of British Algologists.

GRIFFITHSIA *barbata*; filaments dichotomous, slender; articulations slightly pyriform, from five to eight times longer than broad, those near the apices of the branches emitting opposite or whorled, byssoid, dichotomous fibres (or ramuli) to which the tetraspores are attached; favellæ stalked.

GRIFFITHSIA barbata, *Ag. Syst.* p. 145. *Ag. Sp. Alg.* vol. ii. p. 132. *Harv. in Hook. Br. Fl.* vol. ii. p. 338. *Harv. Man.* ed. 1. p. 102. *Kütz. Sp.* p. 660.

CONFERVA barbata, *E. Bot.* t. 1814.

HAB. Parasitical on the smaller Algæ, in tide-pools. Annual. Summer. Very rare, and seemingly confined to the coasts of the British Channel. Beach at Brighton, *Mr. Borrer.* Jersey, *Miss Turner.*

GEOGR. DISTR. North coast of France; not uncommon in old oyster-beds, attached to the shells and to small stones, *Lenormand.*

DESCR. *Fronds* one to three inches high, as thick as hog's bristle below, capillary and byssoid above, forming dense, fastigiate tufts, repeatedly and pretty regularly dichotomous; the lower axils rather distant and patent, the upper close together and very acute. All the lower part of the frond is bare of ramuli; but the articulations of the terminal ramuli give off throughout from their apices, opposite, or whorled, very slender, byssoid, dichotomous, spreading ramelli. *Articulations* from five to eight times as long as broad, slightly swollen upwards, or nearly cylindrical. *Favellæ* pedunculate, formed out of truncate branches, binate, surrounded by numerous, simple or forked, involucral ramuli. *Tetraspores* spherical, attached to the byssoid fibres that issue from the upper articulations, one tetraspore generally on each dichotomous fibre. *Colour* a fine, clear rose-red, changing to orange in fresh water. *Substance* tender and lubricous, most closely adhering to paper in drying.

I am indebted to Miss Turner, of Jersey, for beautiful specimens of this exceedingly rare plant, with both kinds of fructification—from some of which specimens the figure here offered has been prepared. It is only necessary to glance at that figure, and compare it with the other species of *Griffithsia* figured in previous plates of this work, to see the strong characters by which the present is known from all the others. Here the few last articulations of all the branches are furnished with slender, byssoid fibres, and on these fibres the tetraspores are borne. In tenuity of frond there is a resemblance to *G. Devoniensis,* and in the pyriform articulations to *G. corallina*, but the byssoid ramuli are peculiarly its own.

G. barbata was discovered by Mr. Borrer, many years ago, cast ashore on the beach at Brighton, and for a long time our knowledge of the species rested solely on the few specimens so picked up. It is only recently that the plant has been found growing on the shores of the Channel Islands and of the north of France—the only localities hitherto recorded. One would hope that a more accurate exploration of the southern coasts of England and Ireland would, in a favourable season, reward the algologist with a new locality for so rare and so beautiful a plant.

Fig. 1. GRIFFITHSIA BARBATA :—*the natural size.* 2. Part of a frond, bearing tetraspores. 3. Apex of a branch of the same. 4. A tetraspore, attached to a fibre. 5. Part of frond with favella. 6. The favella removed. 7. Spores from the same :—*magnified.*

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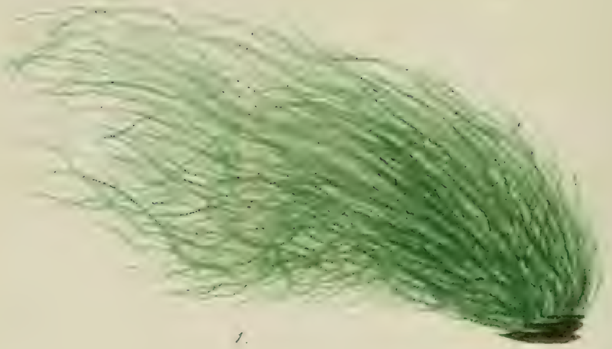
Plate CCLXXXVII.



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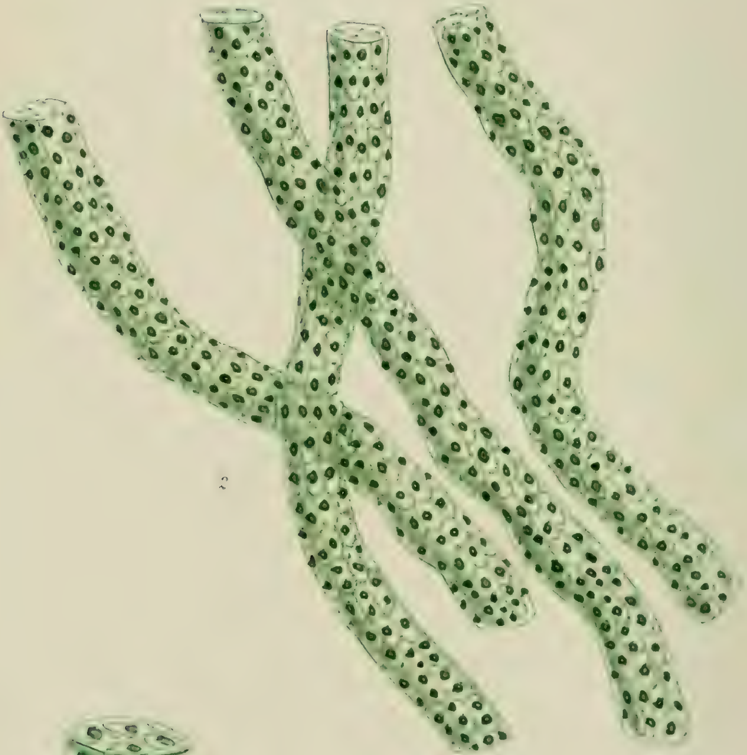

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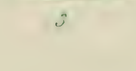

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W. H. H. del. et lith.

[illegible]

PLATE CCLXXXII.

ENTEROMORPHA RALFSII, *Harv.*

GEN. CHAR. *Frond* tubular, membranaceous, of a green colour, and reticulated structure. *Fructification*: granules, commonly in fours, contained in the cells of the frond. ENTEROMORPHA (*Link*),—from εντερον, an *entrail*, and μορφη, *form* or *appearance.*

ENTEROMORPHA *Ralfsii*; frond capillary, simple, or having a few short, spine-like ramuli, nearly solid, laxly reticulated; the cells large, hyaline (two to four in the breadth of the frond), each cell containing a brilliant-green grain of endochrome.

HAB. On the oozy sea-shore, above half-tide level, spreading widely. Annual. Summer. Bangor, North Wales, &c., *Mr. Ralfs.*

GEOGR. DISTR. (?)

DESCR. *Fronds* many inches long, exceedingly slender, varying from less than the diameter of human hair to nearly that of horsehair, densely aggregated, decumbent, and spreading in wide, continuous strata, which cover any object they encounter. Each frond is simple, unbranched, or rarely having a few short, spine-like ramuli scattered here and there; it is curled or flexuous, and sometimes the fronds are so much rolled together and bundled, that it is difficult to disentangle them. The cells of which the frond is composed are remarkably large, sometimes two, sometimes four forming the breadth of the filament; each cell is hyaline, glassy, somewhat distended, and contains a bright-green grain of endochrome in its centre. I have not observed any fructification.

I had prepared the plate here given for the purpose of illustrating *Enteromorpha percursa*, in the full belief that the specimens from which I made my figure were authentic examples of that species, having received them from Mr. Ralfs under that name:—but, happening to show the figure to my friend Mr. Thwaites, that acute botanist assured me that *E. percursa* was something very different. I admit that the diagnosis of *E. percursa* given by Carmichael will not apply to my plant. Of the original *E. percursa* I have, then, as yet seen no specimens, and the plate having been engraved and printed I cannot hold it back for a more minute examination and consultation. I am, therefore, compelled to publish Mr. Ralfs's plant as a novelty, and (if it be new) have great pleasure in bestowing his name upon it. The greater number of cells in the breadth of the frond, and the presence of occasional short ramuli, would seem to be the characters by which *E. Ralfsii* is to be known from the true *E. percursa*. I have no opportunity at present (I write these lines on the shores of America) of examining other specimens, of consulting herbaria, or of communicating with more experienced botanists, and must consequently defer till a future time entering more fully into the distinctive characters of the species now proposed.

Fig. 1. Tuft of ENTEROMORPHA RALFSII:—*the natural size.* 2. Small fragments of different filaments. 3. A transverse section of a filament:—*both magnified.*

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Plate CCLXXXIII.

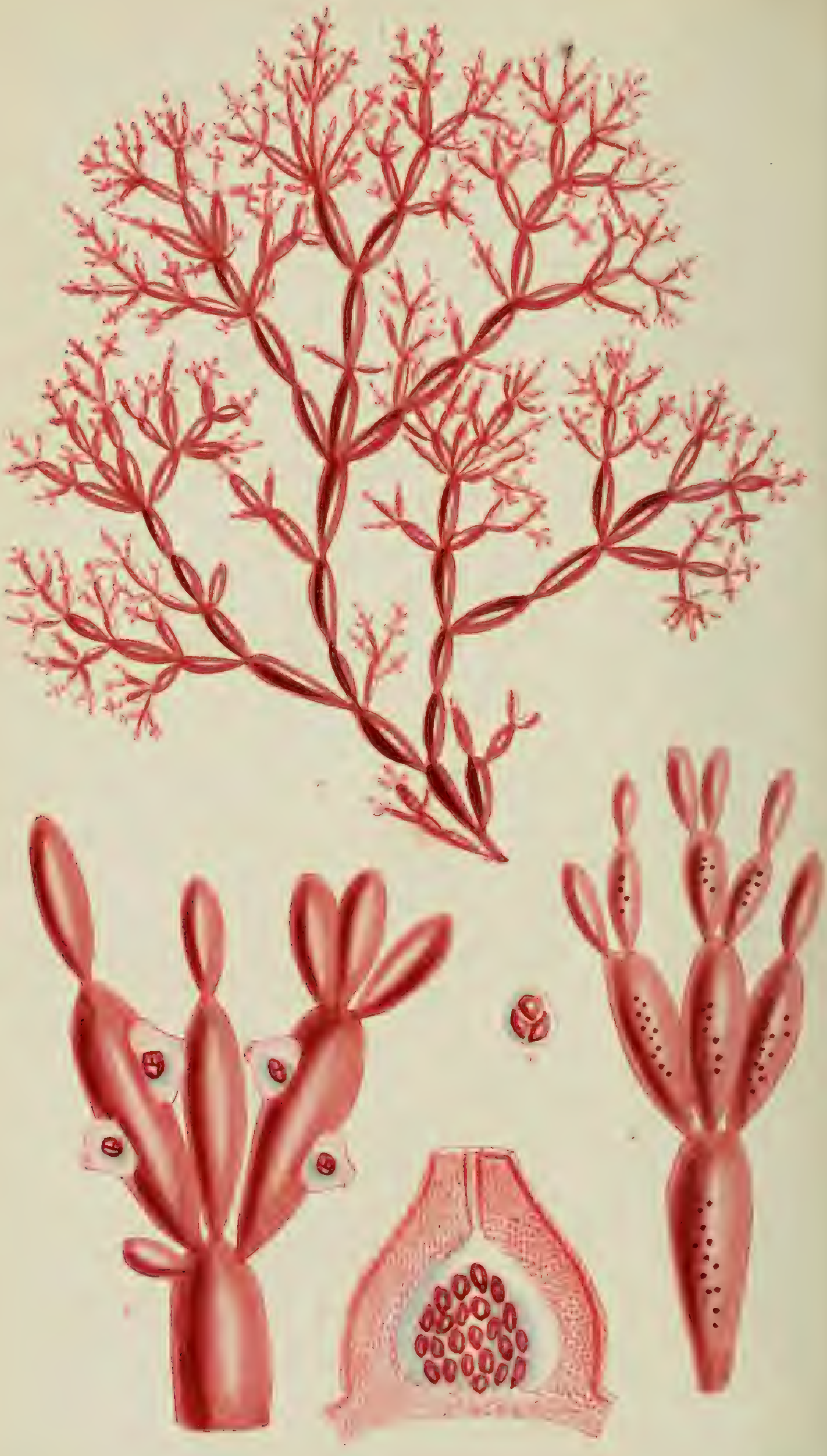

PLATE CCLXXXIII.

CHYLOCLADIA ARTICULATA, *Grev.*

GEN. CHAR. *Frond* (at least the branches) tubular, constricted at regular intervals, and divided by internal diaphragms into joints, filled with a watery juice, and traversed by a few longitudinal filaments; periphery composed of small, polygonal cells. *Fructification,* of two kinds, on distinct individuals; 1, spherical, ovate, or conical *capsules* (*ceramidia*) containing a tuft of wedge-shaped spores on a central placenta; 2, tripartite *tetraspores,* immersed in the smaller branches, near their apices.—CHYLOCLADIA (*Grev.*),—from χυλος, *juice,* and κλαδος, a *branch.*

CHYLOCLADIA *articulata*; frond tubular, gelatinoso-membranaceous, strongly constricted throughout as if jointed, much branched, between pinnate and dichotomous, fastigiate, the upper branches often crowded; capsules obtusely conical.

CHYLOCLADIA articulata, *Grev. in Hook. Br. Fl.* vol. ii. p. 298. *Wyatt, Alg. Danm.* no. 73. *Harv. Man.* ed. 2. p. 102. *Harv. in Mack. Fl. Hib.* pt. iii. p. 200.

LOMENTARIA articulata, *Lyngb. Hyd. Dan.* p. 101. t. 30. *Endl. 3rd Suppl.* p. 43. *Kütz. Phyc. Gen.* p. 441.

CHONDRIA articulata, *Ag. Sp. Alg.* vol. i. p. 357. *Grev. Fl. Ed.* p. 291. *Spreng. Syst. Veg.* vol. iv. p. 342.

GIGARTINA articulata. *Lamour. Ess.* p. 49.

FUCUS sericeus, var. *Esper, Ic. Fuc.* vol. i. t. 82.

FUCUS articulatus, *Lightf. Fl. Scot.* p. 959. *Smith, E. Bot.* t. 1574. *Stack. Ner. Brit.* p. 28. t. 8. *Turn. Syn.* p. 383. *Turn. Hist.* t. 106.

ULVA articulata, *Huds. Fl. Ang.* p. 569.

HAB. Between tide-marks, attached to rocks and Algæ. Annual. Summer. Common.

GEOGR. DISTR. Atlantic and Mediterranean shores of Europe.

DESCR. *Root* of many branching fibres matted together. *Fronds* densely tufted, six or eight to ten inches or more in length, from a quarter line to a line in diameter, tubular, filled with watery fluid and traversed by a few fibres, constricted throughout at regular intervals into joints, the lowermost of which are cylindrical, the upper gradually more elliptical, and those of the upper branches frequently beaded;—much branched from the base, the primary branching dichotomous, the secondary often opposite or somewhat pinnated, and the ramuli frequently whorled round the nodes, particularly in the upper half of the plant:—thus old tufts often become very dense and bushy above from the inordinate number of these whorled branches and ramuli. *Apices* fastigiate, attenuate, in some varieties very much so. *Capsule* obtusely conical, scattered over the upper articulations, opening by a minute pore, the walls thick and composed of minute cells. *Tetraspores* plentifully scattered through the tissue of the articulations. *Colour* varying from a dull to a bright red, or crimson, purplish and iridescent when growing in deep water, glossy, and transparent; becoming darker when dry. *Substance* membranaceous, gelatinous within. In drying it adheres, but not strongly, to paper.

Strange to say, this plant was once regarded as a variety of *Gelidium corneum*! a blunder for which it is difficult to account, the two plants being unlike in form and substance. Stunted individuals of *Chylocladia articulata* much more closely resemble *Catenella Opuntia,* and may sometimes be mistaken for that plant, although the colour is never so lurid as it always is in the *Catenella.* An appeal to the microscope may sometimes be necessary to the young student, and then there can be no difficulty, the whole structure is so different.

Our figure represents a portion of an average-sized specimen from the west of Ireland. This plant often occurs larger—and often very much smaller and more slender. I have some curious varieties from Torquay, in which the branches are much twisted and arched, and very slender. They were matted together in crisp balls, from the excessive abundance of the upper ramuli, and could hardly be pulled asunder without tearing.

Fig. 1. CHYLOCLADIA ARTICULATA; a branch the *natural size.* 2. Small portion with capsules. 3. Section of a capsule. 4. Small portion with tetraspores. 5. A tetraspore:—*all more or less magnified.*

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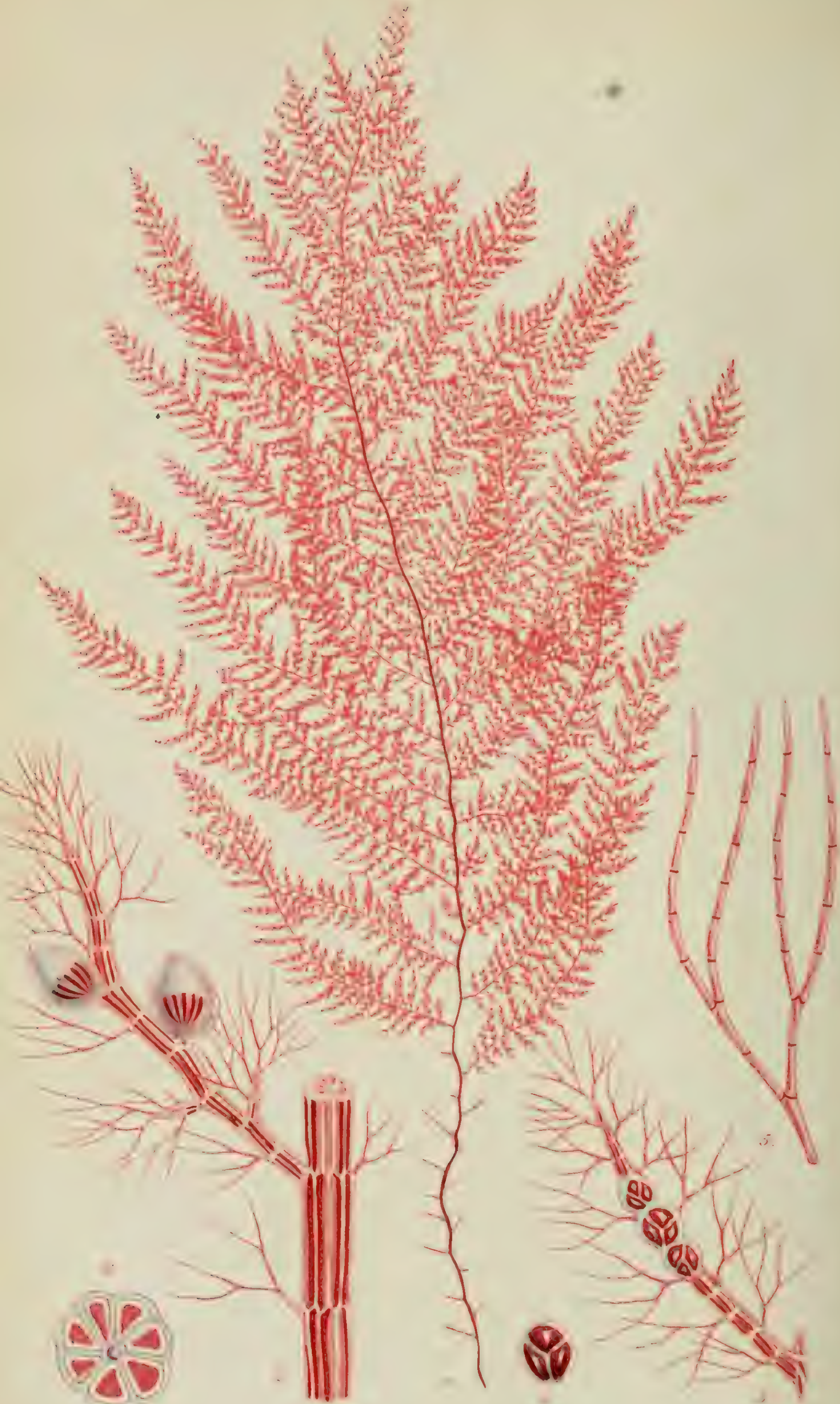
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PLATE CCLXXXIV.

POLYSIPHONIA BYSSOIDES, *Grev.*

GEN. CHAR. *Frond* filamentous, partially or generally articulate; joints longitudinally striate, composed of numerous radiating cells or tubes, disposed round a central cavity. *Fructification* twofold, on different individuals; 1, ovate *capsules* (*ceramidia*), furnished with a terminal pore and containing a tuft of pear-shaped spores; 2, *tetraspores*, imbedded in swollen branchlets. *Polysiphonia* (*Grev.*),—from πολυς, *many*, and σιφων, a *tube*.

POLYSIPHONIA *byssoides*; stems rigid, setaceous, cartilaginous, distichously branched, decomposito-pinnate; branches patent, more or less densely clothed with short, slender, dichotomous, single-tubed, byssoid ramelli; articulations of the stem variable in length, 3–4-striate.

POLYSIPHONIA byssoides, *Grev. Fl. Edin.* p. 309. *Harv. in Hook. Br. Fl.* vol. ii. p. 334. *Harv. Man.* ed. 2. p. 92. *Wyatt, Alg. Danm.* No. 85. *Harv. in Mack. Fl. Hib.* part iii. p. 209. *Endl.* 3rd Suppl. p. 46. *Kütz. Phyc. Gen.* p. 430.

HUTCHINSIA byssoides, *Ag. Sp. Alg.* vol. ii. p. 99.

CONFERVA byssoides, *Eng. Bot.* t. 547. *Dillw. Conf.* t. 48.

CERAMIUM molle, *Roth. Cat. Bot.* vol. iii. p. 138.

FUCUS byssoides, *Good. & Woodw. Linn. Trans.* vol. iii. p. 229.

HAB. On stones and shells, and various Algæ; near low-water mark and in 4–5-fathom water. Generally distributed on the English and Irish coasts;—more rare in Scotland. Orkneys, *Messrs. Thomson and M'Bain.* Frith of Forth, *Sir J. Richardson*, &c.

GEOGR. DISTR. Atlantic shores of Europe. Adriatic, *C. A. Agardh.*

DESCR. *Root* a small disc. *Fronds* from six to twelve inches long or more, as thick as hog's bristle, with an undivided stem running through the whole plant, closely set throughout with distichous, alternate branches similar to the stem, and like it furnished with a second, and in large specimens a third series of lesser branches. The lower branches are longest, the rest gradually shorter upwards, so that the general outline of a frond is broadly ovate, or pyramidal. All the branches and their divisions are clothed with short, byssoid, single-tubed, dichotomous ramelli (*leaves*), which appear to be of the same nature as the fibres in which the young branches of all *Polysiphoniæ* terminate. Every portion of the stem and branches is pellucidly articulate, the articulations 3–4-tubed, the transverse section exhibiting seven siphons; these articulations vary much in length in some specimens, being 4–6 times longer than broad, in others but twice or thrice exceeding their diameter: those of the smaller branches are usually short. *Capsules* ovate, sessile, scattered on the smaller branches. *Tetraspores* immersed in the branchlets, each formed from an articulation. *Colour* a clear and beautiful crimson lake, becoming brownish on exposure, and commonly a dark red-brown in drying. *Substance* when young, extremely soft and flaccid, most closely adhering to paper; when old, rigid, and coarse, with squarrose ramelli.

One of the handsomest of the British species of this extensive genus, especially when young, at which period the whole plant is of the softest substance and most delicate rosy-red colour. In some respects this species connects the genera *Polysiphonia* and *Dasya*, for here, although the tetrasporic fruit is altogether that of a true *Polysiphonia*, the habit of the frond is that of *Dasya*; the byssoid ramelli of this species being identical with those found in the *Dasyæ*. These ramelli appear to be also of the same nature as the fibres found terminating the young branches of other *Polysiphoniæ*, as well as *Rhodomelæ*, &c., and are probably to be regarded as leaves in a very imperfect state of development. In other species they are only found on young parts, and appear to be actively engaged in the growth of the part on which they are found; but in *P. byssoides* they exist at every period, and on all parts of the frond. On old plants or old branches, however, they lose much of their delicacy, and become harsh and squarrose.

Fig. 1. POLYSIPHONIA BYSSOIDES:—*the natural size.* 2. Portion of the frond, with *capsules.* 3. Branchlet with tetraspores. 4. A tetraspore. 5. One of the byssoid ramelli. 6. Transverse section of the stem:—*all magnified.*

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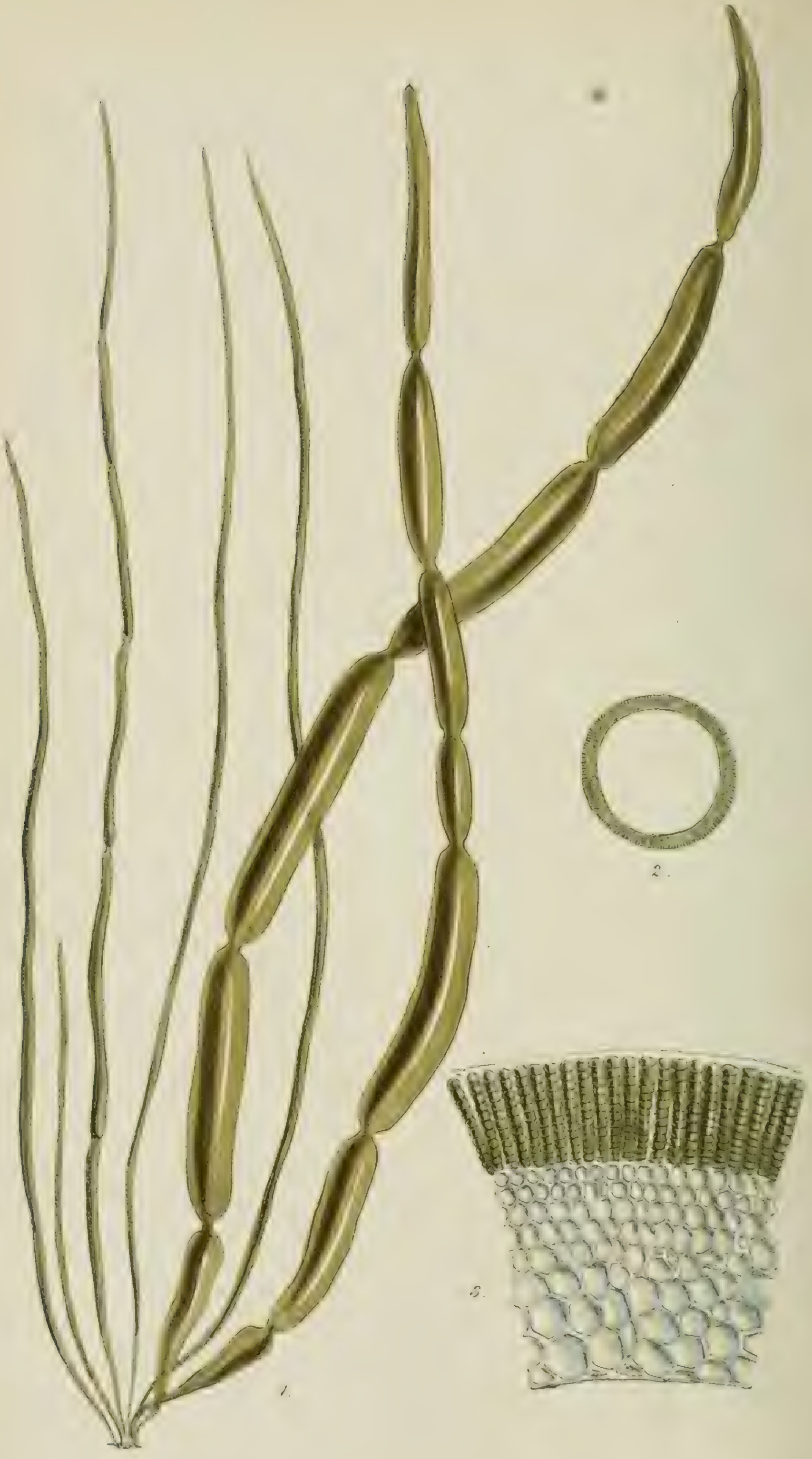
Plate CCLXXXV.



W.H.H. del et lith.

R.B.&R. imp.

PLATE CCLXXXV.

CHORDA LOMENTARIA, *Lyngb.*

GEN. CHAR. *Root* scutate. *Frond* simple, cylindrical, tubular; its cavity divided by transverse membranous septa, into separate chambers. *Fructification,* a stratum of obconical *spores* much attenuated at the base, covering the whole external surface of the frond. Among these are found elliptical *antheridia*. CHORDA (*Stack.*),—a *cord.*

CHORDA *lomentaria*; frond membranaceous, constricted at distant intervals, the interstices inflated.

CHORDA lomentaria, *Lyngb. Hyd. Dan.* p. 74. t. 18. *Grev. Alg. Brit.* p. 48. *Hook. Brit. Fl.* vol. ii. p. 276. *Harv. in Mack. Fl. Hib.* part 3. p. 174. *Harv. Man.* p. 35. ed. 2. p. 32. *Wyatt, Alg. Danm.* no. 6. *E. Bot. Suppl.* t. 2902. *J. Ag. Alg. Medit.* p. 45.

CHORDA fistulosa, *Zanard. Syn. Alg. Adr.* p. 87.

SCYTOSIPHON lomentaria, *Endl. 3rd Suppl.* p. 25. *J. Ag. Spec. Alg.* vol. i. p. 126.

SCYTOSIPHON filum, var. γ, *Ag. Spec. Alg.* vol. i. p. 162. *Ag. Syst.* p. 257.

SOLENIA fuscata, *Bory, Morée,* no. 1485.

ASPEROCOCCUS castaneus, *Carm. Hook. Br. Fl.* vol. ii. p. 277.

CHLOROSIPHON Shuttleworthianus, *Kütz. Phyc. Gen.* p. 301.

HAB. On rocks, stones, and the smaller Algæ, in tide-pools. Annual. Summer and autumn. Abundant on the shores of the British Islands.

GEOGR. DISTR. Atlantic shores of Europe from Norway to Spain. Mediterranean Sea. Shores of North and South America. Japan. Southern and Antarctic Oceans.

DESCR. *Root* a minute, naked disc. *Fronds* from eight to twelve or eighteen inches in length, tapering at the base to the diameter of horse-hair, attenuated upwards, either to a bluntish or a very fine point, from two to four lines in diameter at the greatest breadth, cylindrical, constricted at irregular intervals and furnished with a transverse septum at each constriction. The walls of the tube are composed of a thick layer of large, polygonal cells, of which the outer ones are gradually smaller; on the outside of which, forming the periphery, is a stratum of radiating, close-packed, moniliform filaments. These are only found in their full development in mature specimens. *Colour* a brownish or greenish olive. *Substance* membranaceous and soft, adhering closely to paper in drying.

A common plant, of little beauty, widely dispersed through the temperate oceans of both hemispheres. In a young state no septa are visible externally, the frond being filiform. In this condition it is sometimes a little difficult to distinguish specimens of *Chorda lomentaria,* from narrow ones of *Asperococcus echinatus,* except by their more chestnut colour and more polished surface, and Capt. Carmichael has described such individuals under the name of *A. castaneus.*

Authentic specimens of Kützing's *Chlorosiphon Shuttleworthianus,* obligingly communicated to me by that author, appear to me to belong to the very youngest state of the present plant. They were collected by Mr. Shuttleworth in the West of Ireland, where our *Chorda* is abundant.

Fig. 1. Fronds of CHORDA LOMENTARIA, of various ages;—*the natural size.* 2. Transverse section of the frond. 3. Small portion of the same:—*more highly magnified.*

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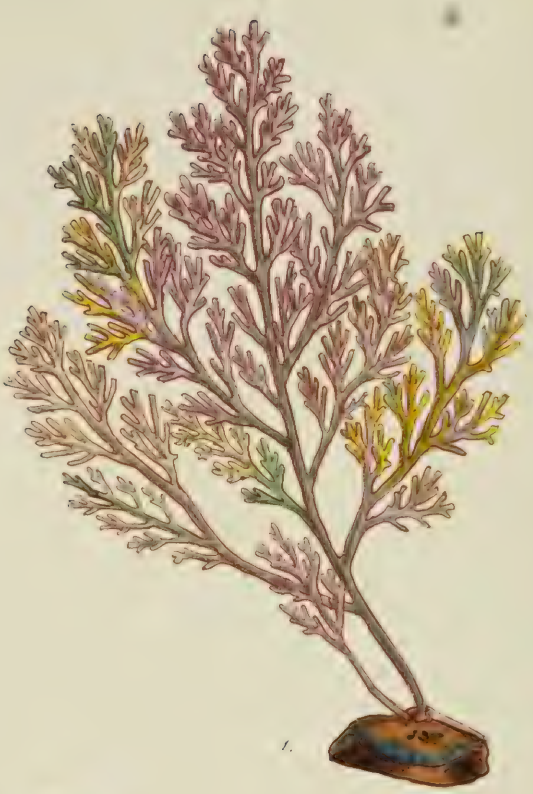

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W. H. H. del et lith.

R. B. & R. imp.

PLATE CCLXXXVI.

LAURENCIA CÆSPITOSA, *Lamour.*

GEN. CHAR. *Frond* cylindrical or compressed, linear, pinnately branched, the apices obtuse; structure cellular, solid. *Fructification* of two kinds, on distinct individuals; 1, ovate *capsules* (*ceramidia*), furnished with a terminal pore, containing a tuft of pear-shaped spores; 2, triparted *tetraspores*, imbedded in the ramuli. LAURENCIA (*Lamour.*),—in honour of M. de la Laurencie, a French naturalist.

LAURENCIA *cæspitosa*; frond cylindrical or subcompressed, narrow, repeatedly pinnate, pyramidal; main branches often opposite, erecto-patent; ramuli irregularly scattered, distichous or spreading on all sides, often crowded, erect, slightly tapering to the base, truncate.

LAURENCIA cæspitosa, *Lamour. Ess.* p. 43. *Mont. Pl. Crypt. Canar.* p. 154. *Harv. Man.* ed. 2. p. 98.

LAURENCIA hybrida, *Lenorm. in Dub. Bot. Gall.* p. 951. *Harv. Phyc. Br.* vol. i. p. xiii.

LAURENCIA pinnatifida, γ angusta, *Grev. Alg. Brit.* p. 109. *Hook. Br. Fl.* vol. ii. p. 296. *Harv. Man.* p. 69. *Harv. Phyc. Brit.* pl. 55. *Wyatt, Alg. Danm.* no. 162.

FUCUS hybridus, *D.C. Fl. Fr.* vol. ii. p. 30.

HAB. On stones and shells, within tide-marks; rarely growing on other small Algæ. Annual. Summer. Common on the shores of the British Islands.

GEOGR. DISTR. Atlantic shores of Europe. Canary Islands. Southern Ocean.

DESCR. *Root* accompanied by creeping fibres. *Fronds* densely tufted, from two to six inches in length, about half a line in diameter, of nearly equal breadth throughout, cylindrical, or very slightly compressed, having a percurrent undivided stem, set with numerous, alternate, or rarely opposite, erecto-patent branches, the lowermost of which are longest, the upper gradually shorter, so that the whole plant has a pyramidal or conical outline. *Branches* repeatedly pinnated, their divisions naked at base, pinnated for three-fourths of their length, all the divisions very erect, blunt, or truncate, each ultimate ramulus frequently bi-trifid at the point. *Ceramidia* . . . ? *Tetraspores* confined to the apices of the ramuli, numerous, tripartite. *Colour*, when the plant grows under favourable circumstances, a very dark, lurid purple: when more exposed to the light, variously greenish or yellowish. *Substance* cartilaginous, becoming softer in fresh water, and then, under pressure, strongly adhering to paper.

I offer this species with some hesitation, as it has hitherto been generally considered by British authors a variety of *L. pin-*

natifida, under which species it is mentioned as *var.* γ, in our first volume. If we take ordinary specimens of *L. pinnatifida* and compare them with specimens of our present plant, they appear distinct enough; but narrow and ill-grown individuals of the former species come very close, it must be confessed, to the latter. The chief characters of our *L. cæspitosa* are a cylindrical frond, with alternate and very erect ramuli. The latter characters and the very lurid colour distinguish it from *L. obtusa.*

L. cæspitosa appears to have been first taken up as a species by Lamouroux, but was long neglected, or confounded with *L. dasyphylla.* The credit of restoring it to a place in the system is due to M. Montagne, who has given an excellent account of it in Mr. Webb's Nat. Hist. of the Canary Islands. It has a wide geographical range, and is tolerably abundant in the places where it occurs.

Fig. 1. LAURENCIA CÆSPITOSA:—*the natural size.* 2. Portion of a branch. 3. Apex of a branchlet, with tetraspores. 4. A tetraspore:—*all more or less highly magnified.*

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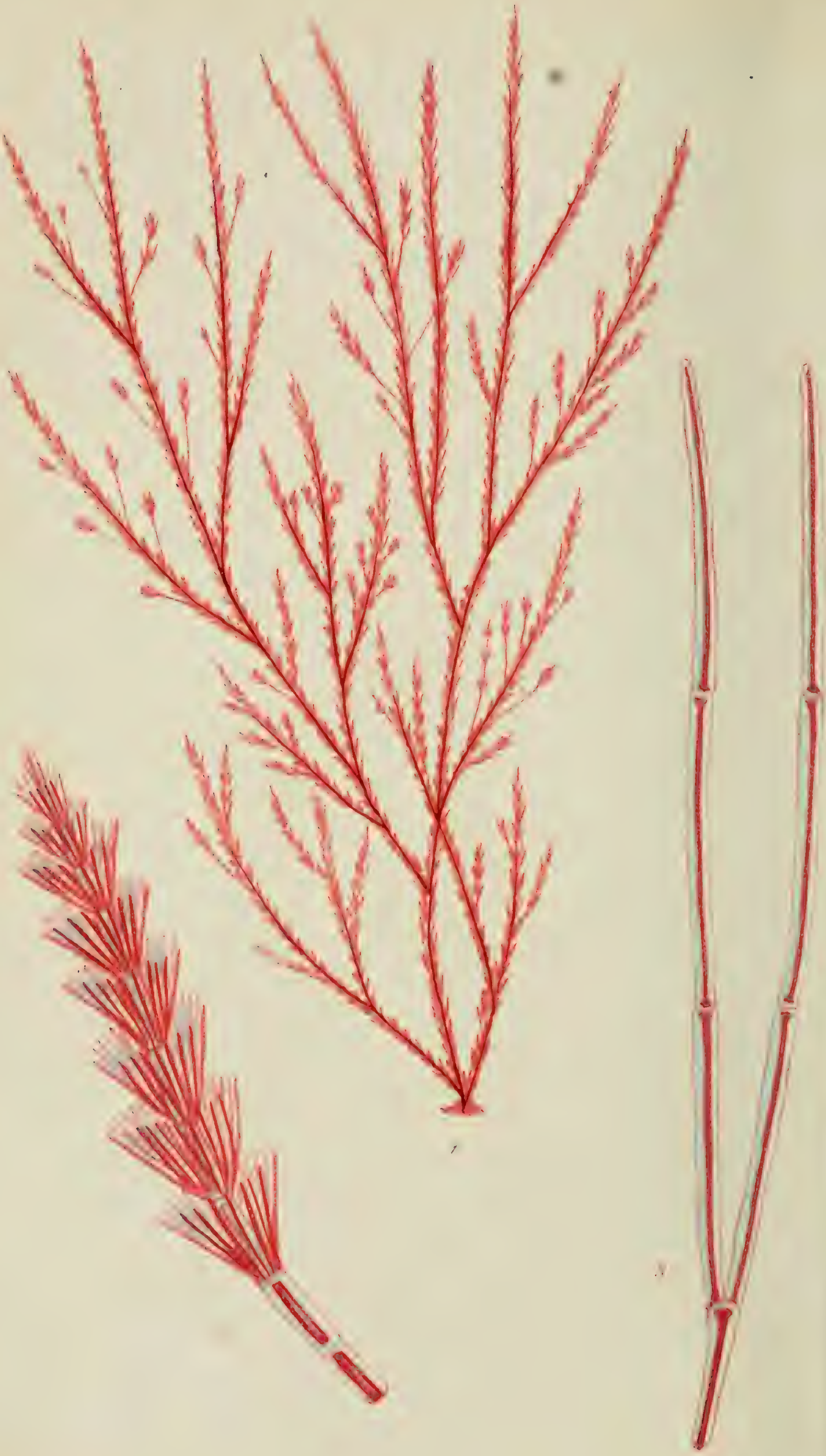

W. H. H. del. et lith.

PLATE CCLXXXVII.

GRIFFITHSIA SIMPLICIFILUM, *Ag.*

GEN. CHAR. *Frond* rose-red, filamentous; filaments jointed throughout, mostly dichotomous; ramuli single tubed; dissepiments hyaline. *Fructification* of two kinds, on distinct individuals; 1, *tetraspores* affixed to whorled involucral ramuli; 2, gelatinous *receptacles* (*favellæ*) surrounded by an involucre, and containing a mass of minute angular spores. GRIFFITHSIA (*Ag.*) in honour of *Mrs. Griffiths,* the most distinguished of British Algologists.

GRIFFITHSIA *simplicifilum*; stems slender, irregularly branched, whorled with imbricated, straight, once-forked ramelli.

GRIFFITHSIA simplicifilum, *Ag. Sp. Alg.* vol. ii. p. 134. *Harv. in Hook. Journ. Bot.* vol. i. p. 301. pl. 139. *Harv. in Mack. Fl. Hib.* part iii. p. 212.

CERAMIUM simplicifilum, *D.C. Fl. Gall. Syn.* p. 8.

HALURUS simplicifilum, *Kütz. Sp. Alg.* p. 663.

HAB. On rocks, &c., near low water-mark, and at a greater depth. Annual. Very rare. On rocks near Black Castle, Wicklow, and among rejectamenta at Ardinairy Point, county Wicklow. *W. H. H.* Coast of Norfolk, *Rev. W. S. Hore.* Jersey, *Miss Turner.*

GEOGR. DISTR. Atlantic shores of France.

DESCR. *Root* clothed with matted and tangled fibres. *Stem* from four to eight or ten inches long, slender, much and irregularly branched; the branches erect, long, straight, virgate, closely whorled throughout with short ramelli. In some specimens the secondary branches are destitute of lateral branches; in others they are more or less densely set with short rudimentary branches, which are sometimes naked below, and having whorled ramelli above, and sometimes clothed with ramelli throughout. *Ramelli* from one to three lines in length, slightly imbricated, several in a whorl; straight, very erect, mostly forked near the base; rarely twice or thrice dichotomous. *Articulations* of the branches about thrice as long as broad; of the ramelli from eight to twelve times as long as broad, having a narrow band of colour with a wide hyaline border. *Fructification* not known, but probably similar to that of *G. equisetifolia.* *Colour* a bright pinky-red, given out quickly on immersion in fresh water. *Substance* membranaceous, adhering to paper, but not very strongly.

The characters by which this plant is to be known from *G. equisetifolia* are, the more slender branches, the more distant and less frequently forked, and straighter ramuli, and the greater proportionate length of the articulations. Usually the colour of *G. simplicifilum* is much brighter than that of *G. equisetifolia*, but this character is not always to be depended upon. Perhaps the other differences mentioned are equally uncertain, and then this supposed species would be reckoned but a slender variety of *G. equisetifolia*, whose peculiar aspect was due to local circumstances. I have usually observed *G. equisetifolia* on rocky shores, exposed to considerable surf, while the most abundant locality for *G. simplicifilum*, and where it keeps all its peculiar characters without change, is on the extensive sandy beaches of Wexford, in comparatively quiet water.

Fig. 1. GRIFFITHSIA SIMPLICIFILUM:—*the natural size.* 2. Portions of a branch, *magnified.* 3. One of the ramelli:—*highly magnified.*

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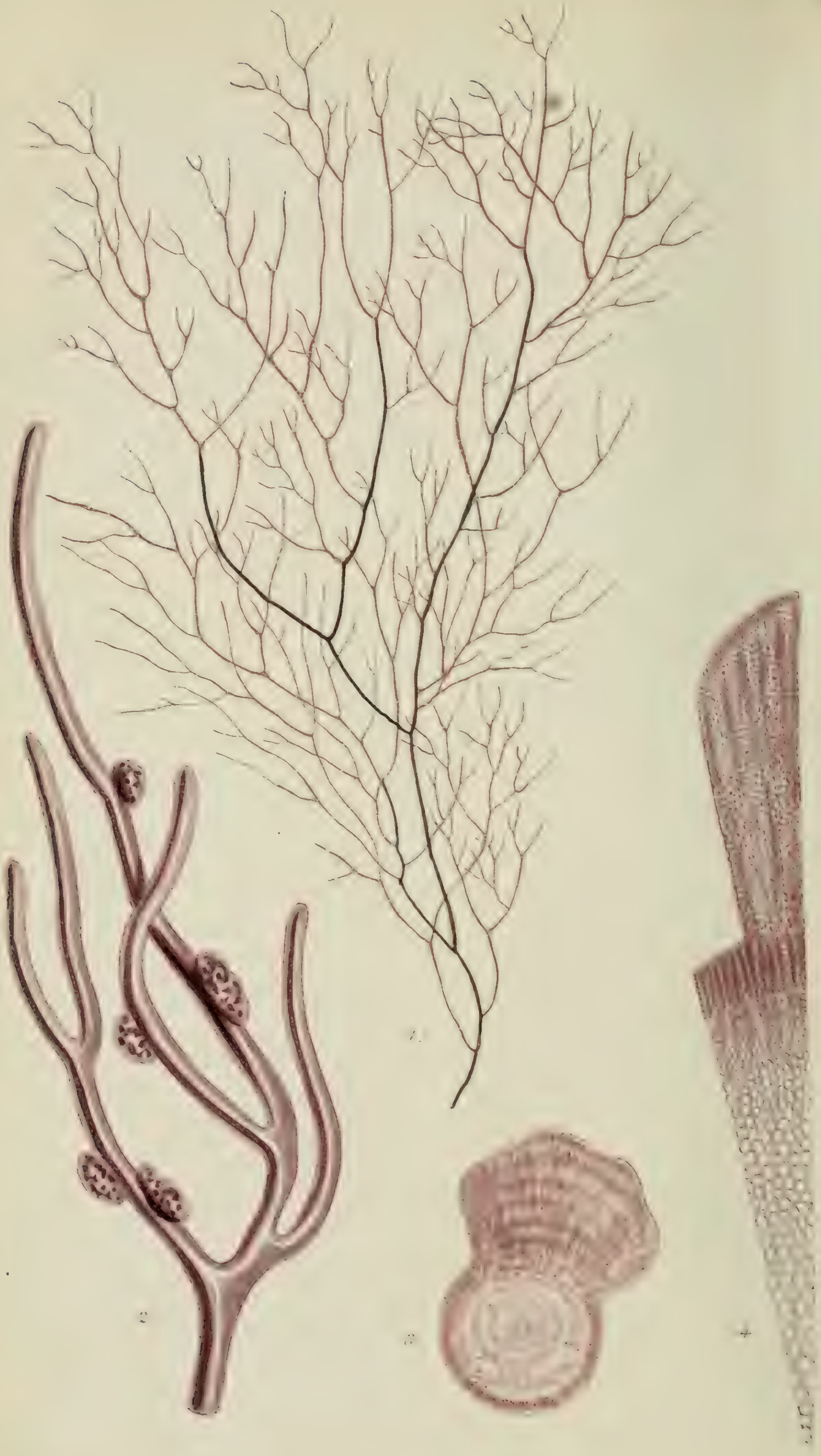
Plate CCLXXXVIII.



W.H.H. del et lith.

R.B. & R. imp.

Plate CCLXXXVIII.

GYMNOGONGRUS PLICATUS, *Kg.*

Gen. Char. *Frond* cylindrical or compressed, horny, much branched, its substance composed of densely packed filaments, of which the innermost are longitudinal, the middle curving outwards, and the external stratum (or periphery) horizontal and moniliform. *Fructification*, naked warts entirely composed of bead-like strings of cruciate tetraspores. Gymnogongrus (*Mart.*),—from γυμνος, naked, and γογγρος, a word applied by Theophrastus to wart-like excrescences on trees.

Gymnogongrus *plicatus*; frond horny, cylindrical, filiform, very irregularly branched, entangled, wiry; branches sub-dichotomous; axils obtuse; ramuli often secund; fructification, oblong warts composed of obscurely-jointed filaments.

Gymnogongrus plicatus, *Kütz. Sp. Alg.* p. 789. *Harv. Man.* ed. 2. p. 145.

Gigartina plicata, *Lamour. Ess.* p. 48. *Lyngb. Hyd. Dan.* p. 42. *Grev. Alg. Brit.* p, 150. *Hook. Br. Fl.* vol. ii. p. 301. *Wyatt, Alg. Danm.* No. 116. *Harv. in Mack. Fl. Hib.* part iii. p. 201. *Harv. Man.* p. 76.

Sphærococcus plicatus, *Ag. Sp. Alg.* vol. i. p. 313. *Syst.* p. 234.

Tylocarpus plicatus, *Kg. Phyc. Gen.* p. 411.

Fucus plicatus, *Huds. Fl. Ang.* vol. ii. p. 589. *Stack. Ner. Brit.* p. 23. t. 7. *Turn. Syn. Fuc.* p. 323. *Hist.* t. 180. *E. Bot.* t. 1089. *Fl. Dan.* t. 408.

Scytosiphon hippuroides, *Lyngb. Hyd. Dan.* p. 63. t. 14.

Hab. On rocks and stones within tide-marks, and at a greater depth. Perennial. Common.

Geogr. Distr. Atlantic shores of Europe and America. New Holland, *Mr. Brown.* Southern Ocean, at Kerguelen's Land, *Dr. Hooker.*

Descr. *Fronds* densely tufted, and often much entangled together, from six to ten inches long or more, filiform, of equal diameter throughout, as thick as hogs' bristles, or somewhat thicker, shrinking in drying, very rigid, wiry, and tenacious, much branched. *Branches* flexuous, very irregular in position and division; sometimes scattered, and sometimes densely aggregated; often secund, rarely opposite, frequently dichotomous; of various lengths, so that the tufts are never fastigiate. The axils of the forkings are distinctly rounded, and the apices of the branches are all blunt. *Fructification*, wart-like excrescences of irregular form, scattered variously over the branches. I have not seen any *tetraspores* in the specimens examined. The whole substance of the wart consists of very slender, densely packed filaments. *Colour*, a dark lurid purple, fading to greenish, and even to yellow and white. The surface is singularly smooth and glossy. In drying, this plant does not adhere to paper.

There is a peculiar rigidity and wiryness in the frond of this plant, which at once distinguishes it from any other British Alga with which it can be confounded: and, when dry, the glossy surface is equally striking. It often occurs in large bundles, very much tangled together, and then looks like a mass of rigid dark-purple bristles.

I have never seen fruit perfectly ripe on any specimens that I have examined. The wart-like receptacles of fruit are common enough, but they seem to come to perfection but seldom. This is very different from the habit of *G. Griffithsiæ*, in whose *gongri* tetraspores are always found, and are some of the most beautiful of marine microscopic objects.

G. plicatus, in its geographical distribution, is almost a cosmopolite.

Fig. 1. Gymnogongrus plicatus:—*the natural size*. 2. Magnified portion of a branch, bearing tubercles. 3. Transverse section of branch and tubercle. 4. A small segment of the same:—*more highly magnified*.

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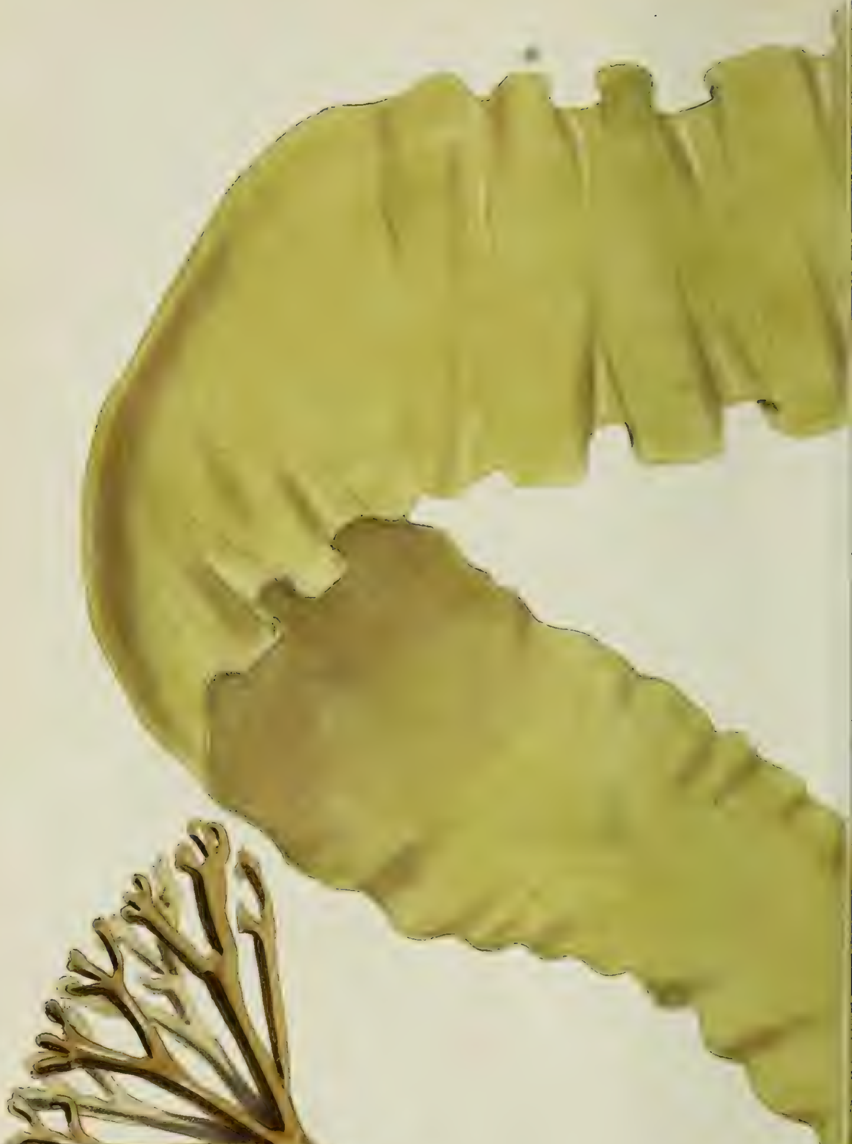

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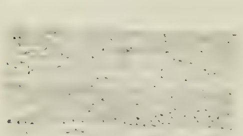

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W.H.H. del et lith.

Plate CCLXXXIX.

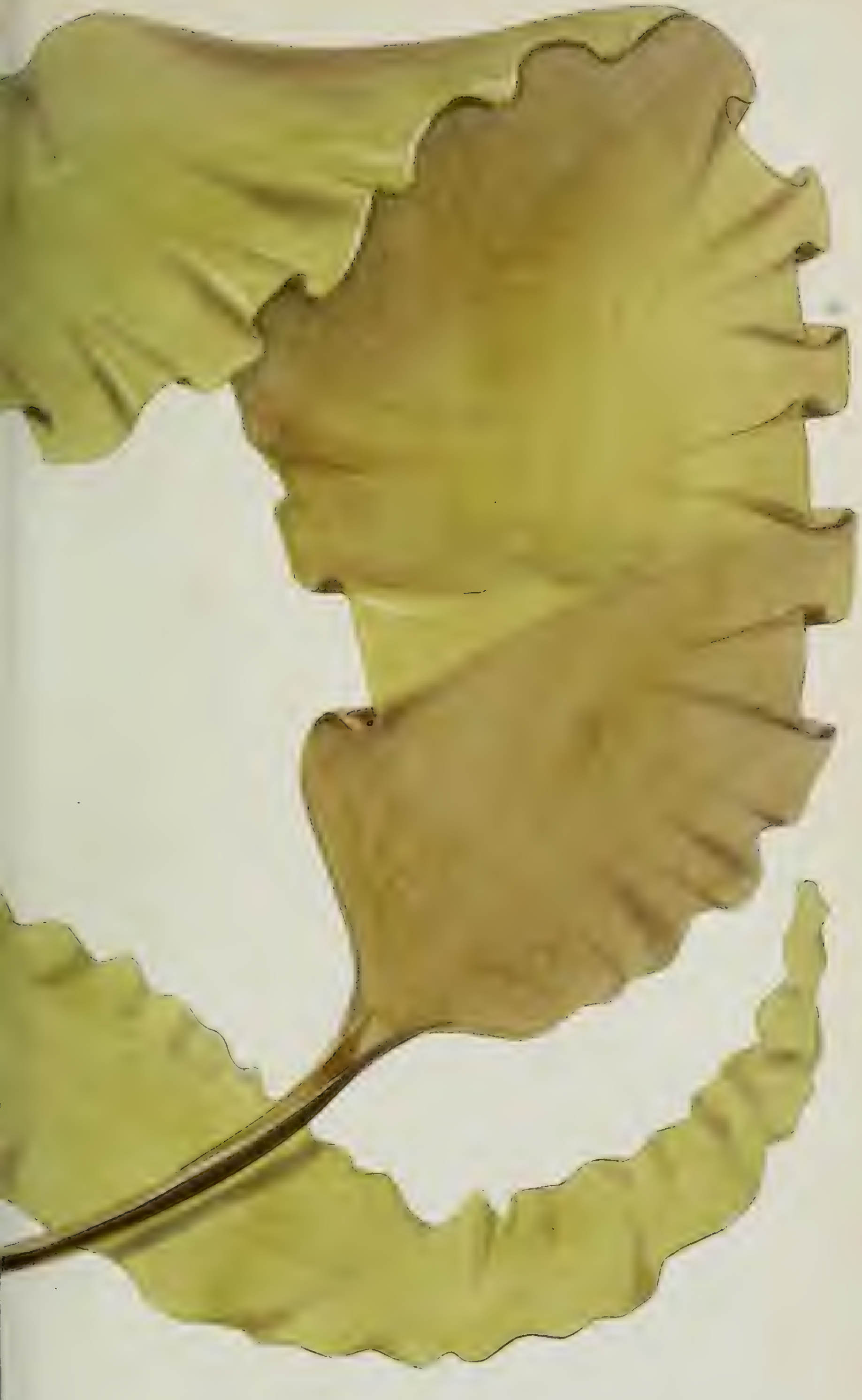

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PLATE CCLXXXIX.

LAMINARIA SACCHARINA, *Lamour.*

GEN. CHAR. *Frond* stipitate, coriaceous or membranaceous, flat, undivided or irregularly cleft, ribless. *Fructification,* cloudy spots of spores imbedded in the thickened surface of some part of the frond. LAMINARIA (*Lamour.*),—from *lamina,* a thin plate, in allusion to the flat frond.

LAMINARIA *saccharina;* stem cylindrical, filiform, expanding into a cartilaginous or submembranaceous, lanceolate, undivided frond.

LAMINARIA saccharina, *Lamour. Ess.* p. 22. *Lyngb. Hyd. Dan.* p. 21. t. 5. *Ag. Sp. Alg.* vol. i. p. 117. *Ag. Syst.* p. 272. *Hook. Fl. Scot.* part 2. p. 98. *Grev. Fl. Edin.* p. 282. *Grev. Alg. Brit.* p. 32. *Hook. Br. Fl.* vol. ii. p. 272. *Wyatt, Alg. Danm.* no. 54. *Harv. in Mack. Fl. Hib.* part 3. p. 171. *Harv. Man.* ed. 2. p. 30. *Endl. 3rd Suppl.* p. 27. *J. Ag. Sp. Alg.* vol. i. p. 134. *Kütz. Phyc. Gen.* t. 24. f. 1. *Kütz. Sp. Alg.* p. 574.

LAMINARIA latifolia, *Ag. Sp. Alg.* vol. i. p. 119. *Ag. Syst.* p. 272. *Grev. Alg. Brit.* p. 34. *Port. et Rupp.* p. 10. *Kütz. Syst. Alg.* p. 575.

FUCUS saccharinus, *Linn. Sp. Pl.* p. 1630. *Fl. Lapp.* p. 364. *Gm. Hist. Fuc.* p. 194. t. 27 & 28. *Huds. Fl. Angl.* p. 578. *Lightf. Fl. Scot.* vol. ii. p. 940. *Good. et Woodw. Linn. Trans.* vol. iii. p. 151. *Turn. Syn.* vol. ii. p. 198. *Turn. Hist.* t. 163. *Esper, Ic. Fuc.* vol. i. t. 24, 56, & 57. *Stack. Ner. Brit.* t. 9. *E. Bot. t.* 1376. *Fl. Dan.* t. 416.

HAB. Attached to rocks and stones near low-water mark, and to the depth of five to ten fathoms. Perennial. Very common all round the coast.

GEOGR. DISTR. Abundant in the Northern Ocean, extending round the world. Atlantic shores of Europe, as far as the south of France, and of North America as far as the Chesapeake (at least).

DESCR. *Root* consisting of several dichotomously branched, clasping fibres, extending from the base of the stem in a conical form, and fixed to the rock by discs or fibrils from their lower surface. *Stem* sometimes a few inches, sometimes several feet in length, from a quarter to half an inch in diameter, cylindrical, compressed above, and dilating into the base of a terminal, simple lamina. *Lamina* from one to six or even ten feet in length, and from two to twelve inches or more in breadth, lanceolate, acute or obtuse, sometimes much acuminated at the point; ovate at base when young, or more or less cuneate, rarely attenuate; the margin sometimes nearly flat and even, sometimes undulate or very much curled; the centre thicker and more opake than the rest of the frond, and sometimes strongly rugose, with wavy transverse ribs, sometimes furrowed longitudinally at one surface of the frond and ribbed at the other, or variously bullated. *Fructification,* according to Turner, occupying irregularly shaped spots, in the centre of the leaf, from half an inch to an inch in width, and of various lengths sometimes extending uninterruptedly throughout the frond, at other times broken without order. *Substance* varying, according to the circumstances under which the plant has been developed, from cartilaginous and coriaceous, which are most common, to delicately membranaceous. *Colour* of the leaf a deep olive, now greenish, now brownish, clear, semitransparent and glossy. As in all the *Laminariæ*, new growth in the frond takes place between the apex of the stem and base of the leaf, the upper portion of the leaf continually dropping off after the new portion is developed.

Every visitant of the sea-shore must be familiar with one form or other of this common plant, which forms a belt, about low-water mark, round all our rocky shores, where its long ribbon-like fronds wave gracefully in the water. It is by no means confined, however, within these limits, but grows in water from five to ten fathoms deep, attached to shells and stones, when rocks are not to be had. In such situations it often acquires a very large size. The variety called by Agardh *L. latifolia* delights in deep water, especially in sheltered bays and coves protected from the ocean by small islands. In many such places on the west of Ireland and Scotland, where the water is clear as crystal, the beautiful broad leaves of this variety may be seen growing luxuriantly several fathoms below the boat in which the observer is sailing over them.

A species with a simple frond and very long stem (*L. longicruris*), in many respects resembling *L. saccharina*, but readily distinguished by the stem becoming hollow, and increasing in diameter upwards, abounds in the Northern Ocean, and should be watched for on the shores of Orkney and Shetland.

Fig. 1. LAMINARIA SACCHARINA, a small specimen :—*the natural size.* 2. Thin slice :—*magnified.*

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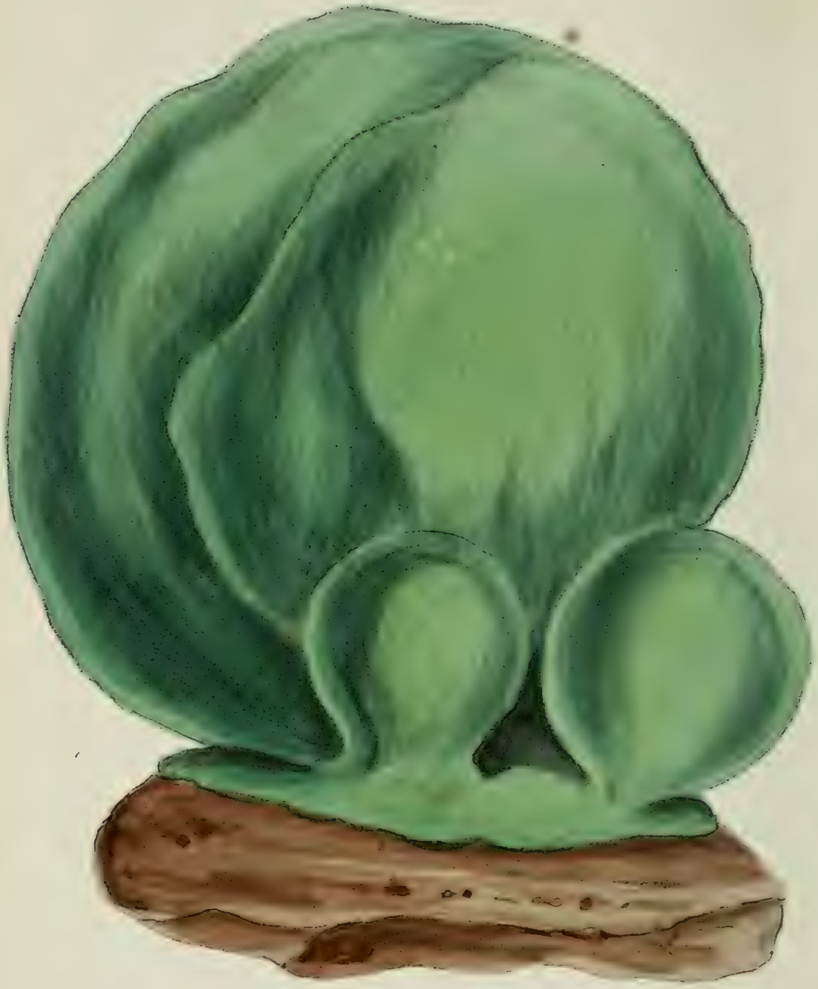
Plate CCXC.



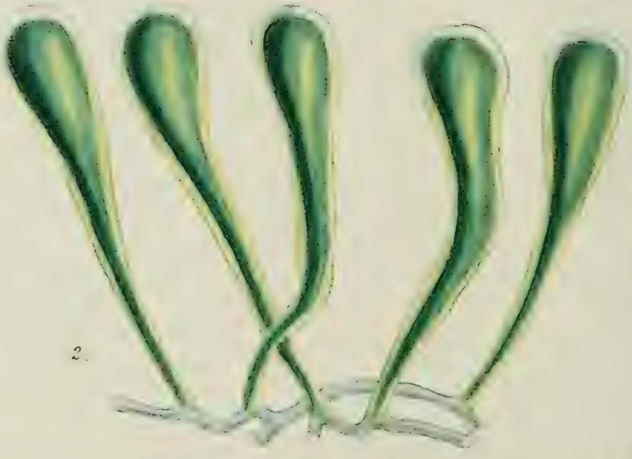


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PLATE CCXC.

CODIUM BURSA, *Ag.*

GEN. CHAR. *Frond* green, sponge-like (globular, cylindrical, or flat; simple or branched), composed of tubular, interwoven, inarticulate filaments (elongated, branching cells). *Fructification,* opake vesicles (*coniocystæ*) attached to the filaments. CODIUM (*Stack.*),—from κωδιον, the *skin of an animal.*

CODIUM *Bursa*; frond spherical, hollow.

CODIUM Bursa, *Ag. Sp. Alg.* vol. i. p. 457. *Ag. Syst.* p. 178. *Grev. Alg. Brit.* p. 186. *Hook. Br. Fl.* vol. ii. p. 318. *Harv. in Mack. Fl. Hib.* part 3. p. 233. *Harv. Man.* ed. 2. p. 193. *Endl. 3rd Suppl.* p. 21. *Kütz. Phyc. Gen.* p. 309. *Kütz. Sp. Alg.* p. 502.

SPONGODIUM Bursa, *Lamour. Ess.* p. 73.

LAMARCKIA Bursa, *Olivi, Zool. Adriat.* p. 258.

AGARDHIA Bursa, *Cabrera,* fide *Ag.*

FUCUS Bursa, *Turn. Hist.* t. 136. *E. Bot.* t. 2183.

ALCYONIUM Bursa, *Linn. Syst. Nat.* p. 1295.

BURSA marina, *C. Bauhin, Pin.* p. 368. *Ray, Syn.* p. 31. no. 3.

HAB. On submarine rocks. Perennial. Summer. Very rare.—"Coast of Sussex, plentifully," *Pallas* (quoted by *Turner*). Shores of Cornwall, *Mr. Rashleigh.* Near Torquay, *Mrs. Griffiths.* Near Belfast, *Mr. Templeton.*

GEOGR. DISTR. Atlantic shores of France and Spain. Mediterranean and Adriatic Seas.

DESCR. *Fronds* attached to the rock by interwoven and matted fibres, several fronds growing together, spherical, hollow, varying in diameter from one to six or eight inches, soft and sponge-like, entirely composed of slender fibres closely interwoven together; those which form the groundwork of the frond matted round the inner surface of the hollow ball, and throwing out to the circumference minute club-shaped, vertical ramuli, which are closely packed together, and extend with their points erect, and sides parallel, like the threads in a pile of velvet. *Substance* soft. *Colour,* when growing, a dark, full green, becoming much paler when dry. *Fructification* not observed, but probably similar to that of *C. tomentosum.*

Not being so fortunate as to possess a British specimen of this very rare and curious plant, I have been forced to make the drawing for the plate from some of a fine series which I owe to the kindness of M. Lenormand, who procured them at Granville, on the French coast, where *Codium Bursa* is common. The station on the Sussex coast, quoted from Pallas, is not prolific in modern times, nor have I ever seen any British specimen except a small one obtained by Mrs. Griffiths, in Devonshire. No one has met with this plant near Belfast but Mr. Templeton, and I have not seen his specimens.

Fig. 1. Codium Bursa, fronds :—*the natural size.* 2. Filaments of which the frond is composed :—*highly magnified.*

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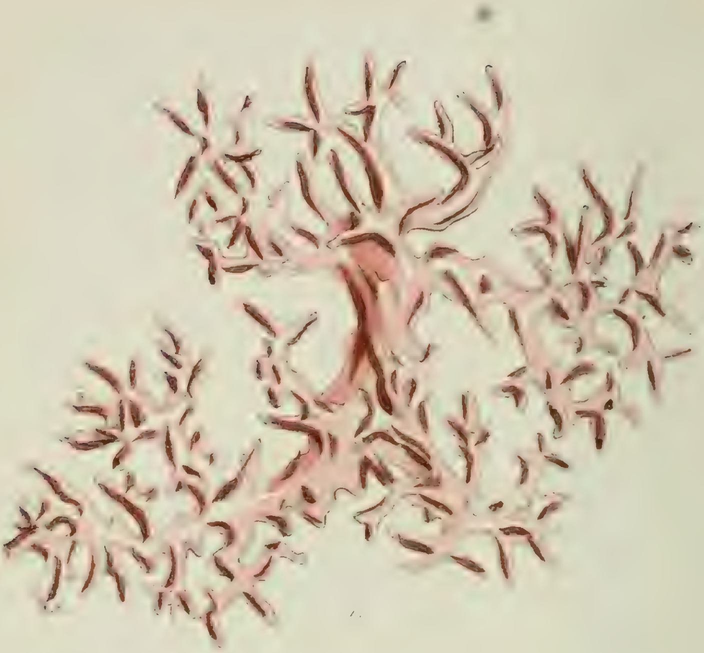
Plate CCXCI.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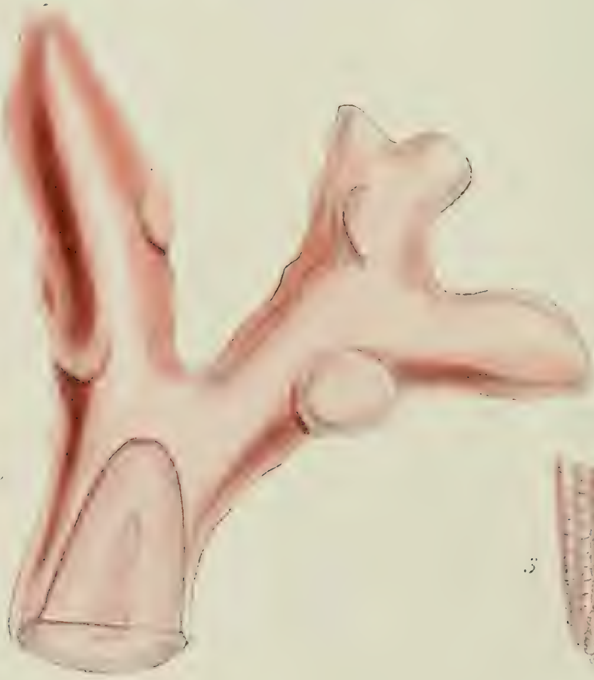
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PLATE CCXCI.

MELOBESIA CALCAREA, *Ell. et Sol.*

GEN. CHAR. *Frond* attached, or free, either flattened, orbicular, sinuated, or irregularly lobed, or cylindrical and branched (never articulated), coated with a calcareous deposit. *Fructification,* conical, sessile *capsules* (*ceramidia*), scattered over the surface of the frond, and containing a tuft of transversely parted, oblong *tetraspores.* MELOBESIA (*Lamour.*),—from one of the sea-nymphs of Hesiod.

MELOBESIA *calcarea*; frond unattached, stony, shrub-like, much branched; branches slender, spreading in all directions, cylindrical, anastomosing below, free above, and tapering to a blunt point; ramuli either simple or forked.

NULLIPORA calcarea, *Johnst. Brit. Lith.* p. 240. t. 24. f. 4, 5.

NULLIPORA fragilis, *M'Calla.*

SPONGITES calcarea, *Kütz. Sp. Alg.* p. 699.

MILLEPORA calcarea, *Ell. et Sol. Zooph.* p. 129. t. 23. f. 13. *Lam. An. s. Vert.* ed. 2. vol. ii. p. 312.

HAB. On shingly or sandy shores, in 5–15 fathom water. Perennial.—Coasts of South of England, and West of Scotland and Ireland, abundant in many places.

GEOGR. DISTR. Probably widely dispersed; I have specimens from New Zealand (*Dr. J. D. Hooker*), and the Galapagos Group (*Mr. Darwin*).

DESCR. *Fronds* lying at the bottom of the sea without any attachment, heaped together in large masses, on widely spreading strata, the surface individuals of which only are alive. Each plant is from one to three or four inches in diameter, forming a roundish shrub-like mass of stony branches, which spring from a thickened centre, and extend in all directions, being more or less confluent in their lower part, but quite free above. These branches are flexuous, irregularly divided, either dichotomous or fingered, terete, gradually tapering towards the extremity, and ending in a blunt point. *Substance* stony, very brittle. *Colour,* when quite fresh, a deep blood-red, soon passing, on the death of the plant, to that of brick-dust, and, after bleaching in the sun, to a snowy whiteness. The tissues throughout the whole frond are filled with carbonate of lime, which must be removed by acid before the cells can be seen:—the latter are then found to be very minute, arranged in slender, closely-packed series or threads.

* * *

This is one of the commonest of the British deep-water species of *Melobesia,* being found in many parts of the coast, and generally in great abundance. It forms extensive banks, on which the fronds are heaped together without order, and appear to be kept from drifting merely by their weight. The specimens at the top of the banks are alone living; those underneath, as may be at once known by their faded colour and offensive smell, are always found dead. In the West of Ireland, where this species abounds, it has been used as manure with success, being particularly suited to a peaty soil ; but, as it requires to be dredged up—its weight and the depth at which it vegetates preventing its being drifted in quantity ashore,—the full use is not made of it by the peasantry which its value would seem to call for. In many districts where lime is scarce, a considerable quantity might be obtained by burning this plant. The "coral sand," so abundantly employed on the shores of Bantry Bay, owes its fertilizing properties to the remains of Cellepores and other zoophytes, of whose débris it chiefly consists.

Fig. 1. Melobesia calcarea :—*the natural size.* 2. Portion of a branch, cut to show the internal structure :—*slightly magnified.* 3. Cells of which the frond is composed :—*highly magnified.*

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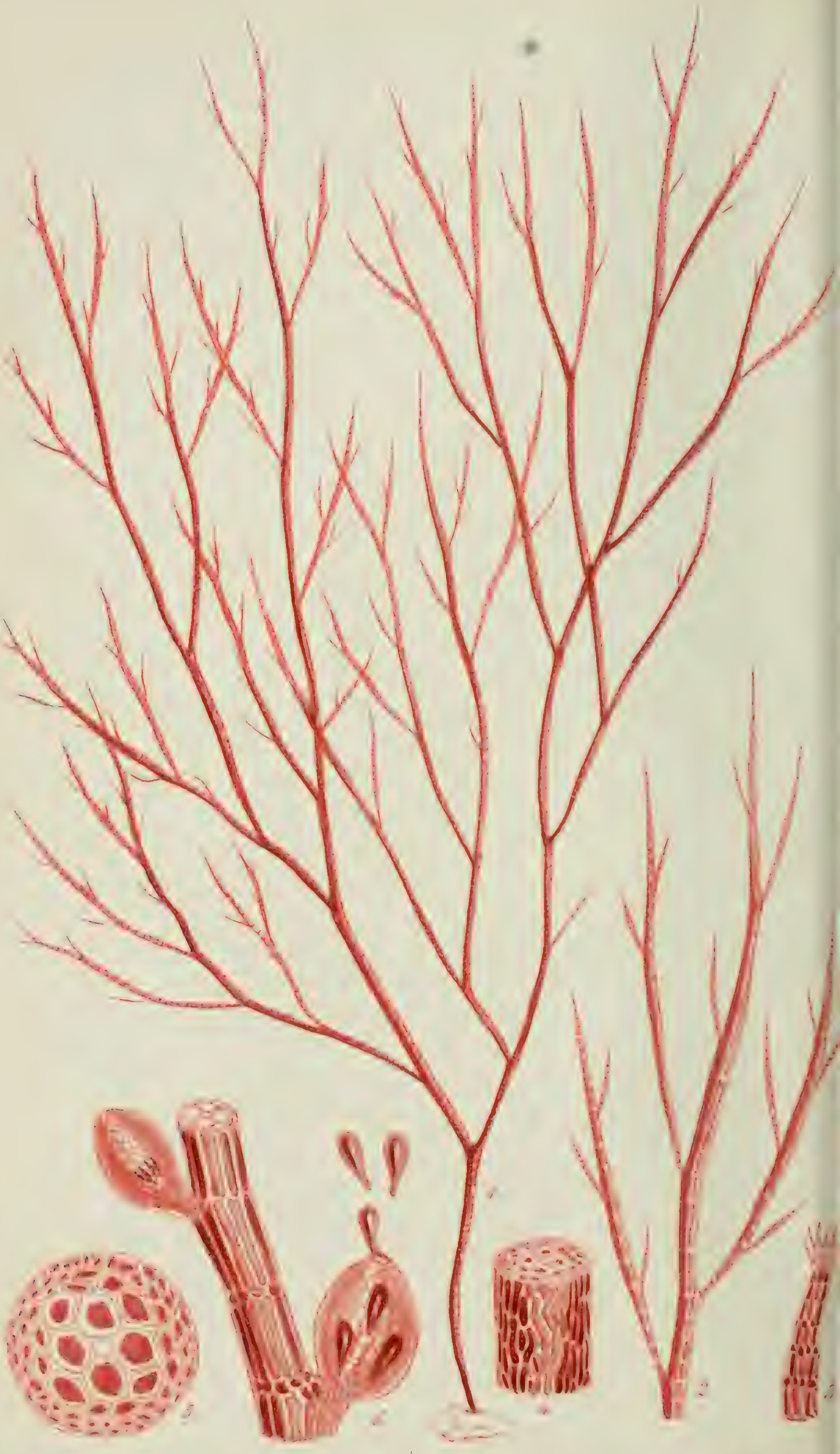

W. Fitch del. et lith. [illegible]

PLATE CCXCII.

POLYSIPHONIA ELONGATA, *Grev.*

GEN. CHAR. *Frond* filamentous, partially or generally articulate; joints longitudinally striate, composed of numerous radiating cells or tubes, disposed round a central cavity. *Fructification* twofold, on different individuals; 1, ovate *capsules* (*ceramidia*) furnished with a terminal pore, and containing a tuft of pear-shaped spores; 2, *tetraspores*, imbedded in swollen branchlets. POLYSIPHONIA (*Grev.*),—from πολυς, *many*, and σιφων, a *tube*.

POLYSIPHONIA *elongata*; stems robust, cartilaginous (rarely gelatinous), irregularly branched, beset, especially towards the tips, with slender, close-set, multifid ramuli, which are attenuate to the base and apex; articulations about as long as broad (the upper ones rarely once and half to twice as long), those of the stem reticulated with veins and more or less obsolete.

POLYSIPHONIA elongata, *Harv. in Hook. Br. Fl.* vol. ii. p. 333. *Wyatt, Alg. Danm.* no. 40. *Harv. in Mack. Fl. Hib.* part 3. p. 209. *Harv. Man.* ed. 2. p. 86. *J. Ag. Alg.* p. 136. *Endl. 3rd Suppl.* p. 45. *Kütz. Phyc. Gen.* p. 428. *Sp. Alg.* p. 828.

POLYSIPHONIA Ruchingeri, *J. Ag.! Alg. Medit.* p. 136. *Kg.! Phyc. Gen.* p. 428. *Kg.! Syst. Alg.* p. 829.

POLYSIPHONIA rosea, *Grev.! Fl. Edin.* p.

POLYSIPHONIA stenocarpa, *Kg. Sp. Alg.* p. 830. (*fide sp. a Zanard.*)

POLYSIPHONIA chalarophlæa, *Kg.! Sp. Alg.* p. 831.

POLYSIPHONIA clavigera, *Kg. Sp. Alg.* p. 831. (*fide sp. a Zanard.*)

HUTCHINSIA elongata, *Ag. Syn.* p. 54. *Hook. Scot.* part 2. p. 87. *Ag. Syst.* p. 152.

HUTCHINSIA Ruchingeri, *Ag. Sp. Alg.* vol. ii. p. 86.

CERAMIUM elongatum, *Roth, Cat. Bot.* vol. iii. p. 128. *Ag. Disp.* p. 19. *Lyngb. Hyd. Dan.* p. 117. t. 66. D. 1. *Grev. Fl. Edin.* p. 310.

CERAMIUM brachygonium, *Lyngb. Hyd. Dan.* p. 118. t. 36.

CONFERVA elongata, *Huds. Fl. Angl.* vol. ii. p. 599. *Dillw. Conf.* t. 33. and suppl. t. G. *E. Bot.* t. 2429.

HAB. Common on stones and shells, in pools between tide-marks, and attached to oyster and scallop shells, &c., in 5–10 fathoms water. Perennial, or at least biennial. Spring and summer.

GEOGR. DISTR. Atlantic and Mediterranean shores of Europe. North America.

DESCR. *Root* a small disc. *Fronds* solitary, or a few together, but scarcely tufted, from six to twelve inches high, robust, varying in diameter from the thickness of hog's bristle to that of the antenna of a lobster, rising with an undivided stem for an inch or two, then much branched and bushy. *Branches* long, sometimes rod-like and scarcely divided, sometimes repeatedly dichotomous or alternately branched; at other times fasciculate or very irregular in division;—now nearly or quite destitute of ramuli, again densely clothed with them, always attenuated at the base, just at the insertion, and tapering at the apex to a fine point. *Ramuli* narrow-spindle-shaped, tapering much to the base and apex, and ending in short fibrils, scattered or crowded, from a quarter to half an inch long or more, not abundant the first season, but very luxuriant in plants of the second year, always softer and of more intense colour than other parts of the frond. *Articulations* of the stem and branches more or less opake, but generally visible, coated with small, sinuous cells, shorter than their diameter; those of the tips of the branches and ramuli more transparent, as long, or once and half, sometimes twice as long, as broad, marked with more parallel tubes, and having transparent dissepiments. *Capsules* ovate, sessile or slightly stalked. *Tetraspores* large, contained in swollen and distorted ramuli. *Substance* of the stem cartilaginous and stiff,—of the ramuli very soft and gelatinous:—in some deep-water varieties (*P. rosea*) the whole plant is flaccid and gelatinous. *Colour* of the ramuli a fine crimson-lake, of the stem and branches dark red or brown.

For remarks, see the following Plate.

Fig. 1. POLYSIPHONIA ELONGATA, plant of the first year:—*the natural size.* 2. Branchlets of the same. 3. Apex of a branchlet. 4. Portion of the stem. 5. Cross section of the stem. 6. Ceramidia and spores:—*magnified.*

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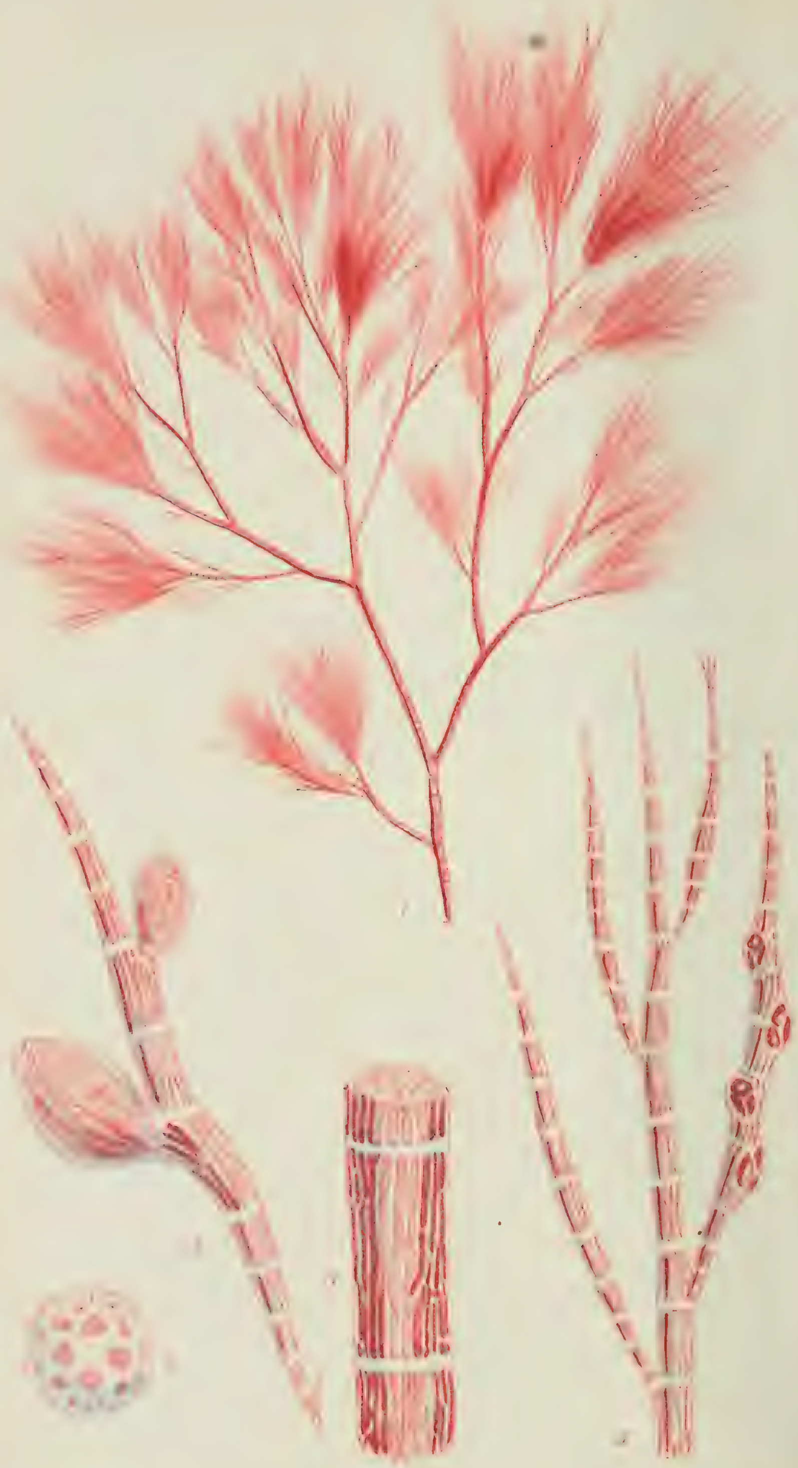
Plate CCXCIII



W. H. H. del et lith.

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PLATE CCXCIII.

POLYSIPHONIA ELONGATA, *Grev.*

(*For description, see last page.*)

In last plate we have figured the ordinary form of *P. elongata* (*Lobster-horns*) in plants of the first season; and our present plate represents a plant of the second year's growth. In winter the tips of the branches and ramuli of the first year fall away, leaving a stunted and broken frond, very unsightly and often distorted: this constitutes *Ceramium brachygonium* of Lyngbye. Early in spring, new growth commences;—the broken branches put forth vigorous shoots, ending in broad pencils of crimson ramuli, which in a short time clothe the whole upper part of the frond in the rich costume which we have endeavoured here to portray. These different aspects of the species are puzzling to a young observer, who is apt to take a plant of the second year for a different species;—but were these the only difficulties connected with *P. elongata*, a little practice would soon enable the young botanist to surmount them:—for similar changes from winter to summer occur in many other Algæ, as *Rhodomela subfusca, Desmarestia aculeata,* &c., and are no other than what continually pass under our eye in the case of land plants whose leaves are deciduous.

But unfortunately, *P. elongata* varies in other respects, as may be inferred from the several synonyms which I have enumerated, a list that would probably be extended had I the advantage of consulting authentic specimens of several other reputed species. The form called *P. Ruchingeri,* originally found in the Adriatic, is common enough on our coast, and differs from ordinary *P. elongata* in being much more slender, of less cartilaginous substance, and especially in having longer articulations. I have examined authentic specimens communicated by Prof. J. Agardh, and failed to detect any character which may not be found more or less strongly marked in some specimens of *P. elongata*, so that these two forms are easily traced into one. Of the three species quoted from Kützing, I have only seen one authentically named; the other two were communicated by M. Zanardini, on whose authority my specimens rest. Judging by the specimens I have examined, as well as by the descriptions given by Kützing, I have no hesitation in referring them to *P. elongata*; and probably several other species described by Kützing in the same section might also be added without impropriety.

Dr. Greville's *P. rosea* has much more the aspect of a distinct species than any of those already alluded to. It seems confined to deep water, and is much more flaccid than ordinary *P. elongata*, almost gelatinous, closely adhering to paper in every part, and of a brilliant rosy crimson colour. It was first found by Sir John Richardson among rejectamenta in the Frith of Forth, and has been more recently dredged near Carrickfergus by the late Mr. M'Calla, from whom I have excellent specimens.

I should mention another plant recently found in Cork Harbour by Lady Louisa Tenison, which seems almost intermediate between *P. elongata* and *P. elongella*, but different from both. At present I hold it over for future determination. *P. Grevillii*, Harv., appears, from a recent analysis, to be nothing more than *P. violacea*, of a brighter red colour than usual.

Fig. 1. POLYSIPHONIA ELONGATA, a plant of the second year:—*the natural size*. 1. Ramulus with ceramidia. 3. Portion of one of the smaller branches. 4. Transverse section of the same. 5. Ramuli with *tetraspores*:—*all magnified*.

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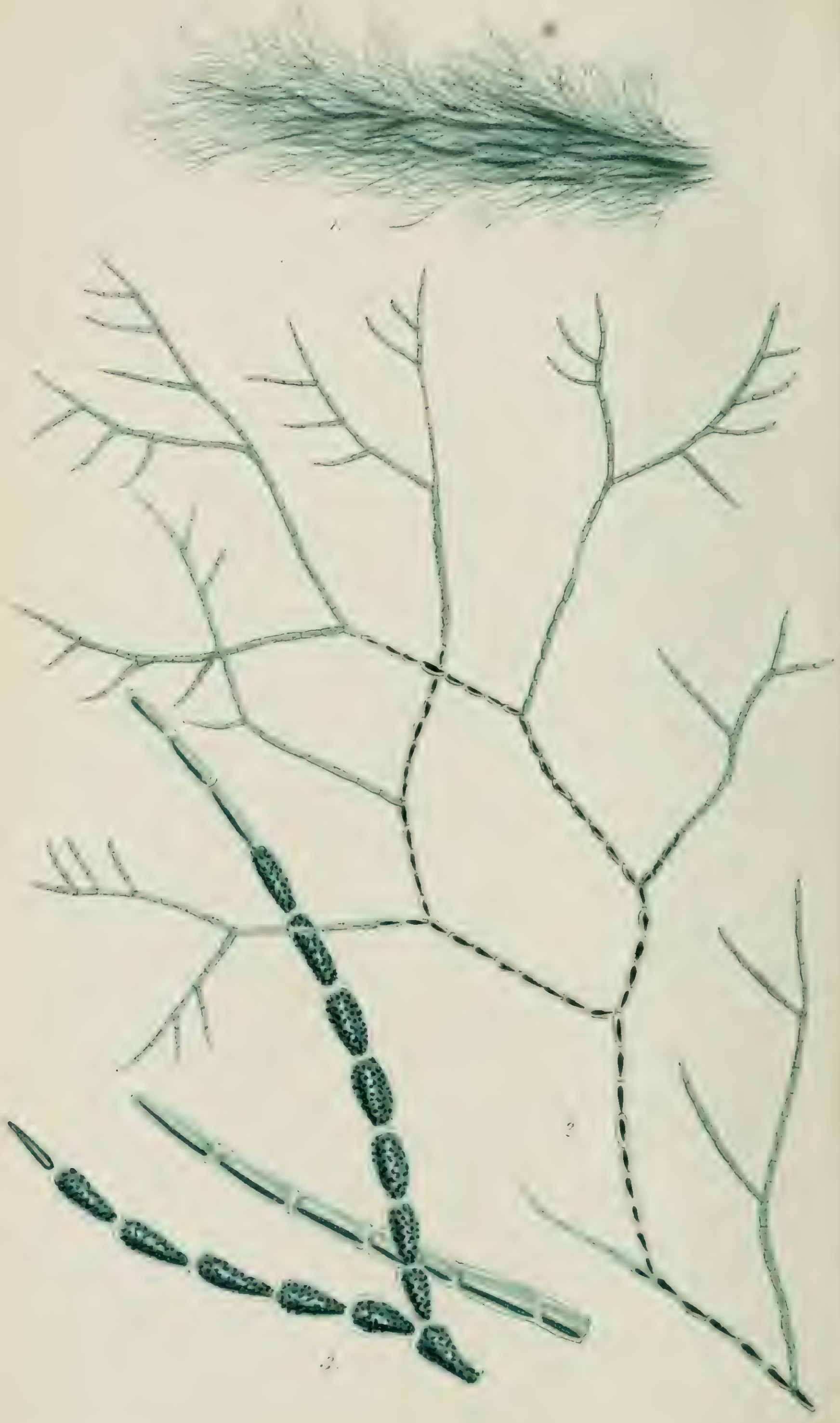
Plate CCXCI



F. Reeve, imp.

Plate CCXCIV.

CLADOPHORA FRACTA, *Ag.*

Gen. Char. *Filaments* green, attached, uniform, branched, composed of a single series of cells or articulations. *Fruit*, aggregated granules or zoospores, contained in the articulations, having, at some period, a proper ciliary motion. Cladophora (*Kütz.*),—from κλαδος, a *branch*, and φορεω, to *bear*.

Cladophora *fracta*; tufts irregular, entangled, often detached and then forming floating strata, dull green; filaments somewhat rigid, distantly branched, the lesser branches somewhat dichotomous, spreading, with very wide axils, the ramuli few, alternate or commonly secund; articulations from three to six times as long as broad, at first cylindrical, then elliptical, with contracted dissepiments.

Cladophora fracta, *Kütz. Phyc. Gen.* p. 263. *Kütz. Sp. Alg.* p. 410. *Harv. Man.* ed. 2. p. 206.

Conferva fracta, *Fl. Dan.* t. 946. *Dillw. Conf.* t. 14. *E. Bot.* t. 2338. *Web. et Mohr, Gr. Conf.* t. 14. *Roth, Cat. Bot.* vol. iii. p. 230. *Ag. Disp.* p. 31. *Ag. Syst.* p. 109. *Lyngb. Hyd. Dan.* p. 152. t. 52. *Harv. in Hook. Br. Fl.* vol. ii. p. 356. *Harv. Man.* ed. 1. p. 134. *Harv. in Mack. Fl. Hib.* part 3. p. 227.

Conferva divaricata, *Roth, Cat. Bot.* vol. i. p. 179.

Conferva vagabunda, *Huds. Fl. Angl.* vol. ii. p. 601. *Lightf. Fl. Scot.* vol. ii. p. 990. *Dillen. Hist. Musc.* t. 5. f. 32.

Conferva hirta, *Fl. Dan.* t. 947.

Conferva flavescens, *Wyatt, Alg. Danm.* no. 224. (*not of Roth.*)

Hab. In ditches of brackish water, communicating with the tide; also in fresh-water lakes, ditches, and streams. Common.

Geogr. Distr. Abundant throughout Europe.

Descr. At first forming loose tufts, which frequently become detached, and the plant is more commonly found constituting floating strata, many tufts entangled together in each floating mass. *Filaments* capillary, from six to eight or ten inches long, much, but very irregularly branched, the branches distant, spreading at wide angles, or much divaricated, either dichotomous or alternate; the lesser branches repeatedly forked, with wide axils, and the ramuli, which are few and very patent, commonly secund, sometimes alternate. *Articulations* three or four times as long as broad, rarely six times as long, those of the upper branches pretty uniformly thrice as long as their diameter, at first cylindrical, then becoming pyriform, and when mature elliptical, when the branches resemble strings of dark-green beads. *Dissepiments* finally much contracted. *Colour* at first a pleasant grass-green, becoming darker and duller as the plant advances in age. The endochrome is at first fluid, but in the full-grown articulations (which are in fact changed into *sporangia*) it becomes distinctly granular, very dense, and of a dark colour. In drying the plant adheres to paper, but not very firmly.

The occasional occurrence of this species in salt-water ditches near the coast gives it a claim to be admitted into the present work, similar to that allowed in the cases of several other of these brackish-water plants. *C. fracta* is rarely found attached. It is more commonly met with heaped together in widely extending strata, covering the surface of the water. Sometimes in lakes, as it thus floats about, it becomes rolled together in dense balls, which have a good deal of the aspect of *C. ægagropila*, but not the same regularly radiant structure. When fully developed and in mature fruit, the middle portion of the frond is very frequently entirely converted into a string of *sporangia*, and is then a beautiful and characteristic microscopic object, which it is impossible to mistake for anything else. When not in fruit, *C. fracta* is more easily known from *C. flavescens*, which is closely allied to it, by the shorter articulations, than by any other character.

Fig. 1. Part of a floating mass of CLADOPHORA FRACTA :—*the natural size.* 2. Branches of the same :—*magnified.* 3. Small portions in a young and a mature state :—*highly magnified.*

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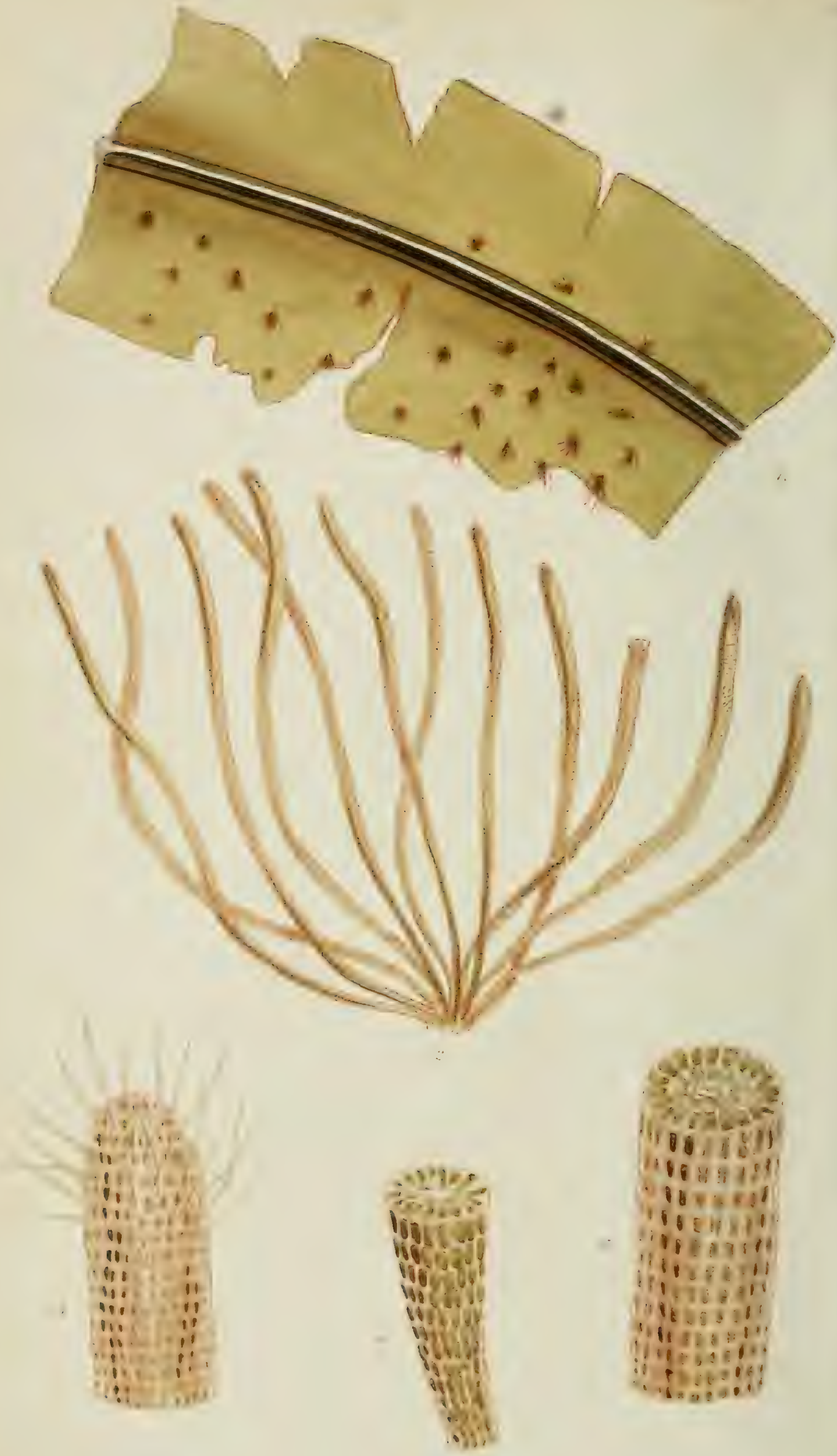

W.H.H. del et Lith.

F. Reeve imp.

PLATE CCXCV.

LITOSIPHON LAMINARIÆ, *Harv.*

GEN. CHAR. *Frond* unbranched, cylindrical, filiform, cartilaginous, subsolid, at length tubular, composed of several rows of cells; the surface areolated. *Fructification* solitary or aggregated, naked *spores,* scattered irregularly over the surface of the frond. LITOSIPHON (*Harv.*),—from λιτος, *slender,* and σιφων, a *tube.*

LITOSIPHON *Laminariæ*; fronds stellately tufted, short, cylindrical, blunt, slightly tapering at the base, smooth (or hairy toward the apex), transversely banded, the bands close together; spores scattered, or several in each transverse band.

LITOSIPHON Laminariæ, *Harv. Man.* ed. 2. p. 43.

DESMOTRICHUM Laminariæ, *Kütz. Sp. Alg.* p. 470.

CHLOROSIPHON Laminariæ, *Harv. in Phyc. Brit.* vol. i. p. x. (*list of species.*)

BANGIA Laminariæ, *Lyngb. Hyd. Dan.* p. 84. t. 24. *Ag. Syst.* p. 75. *Hook. Br. Fl.* vol. ii. p. 316. *Harv. in Mack. Fl. Hib.* part 3. p. 241. *Harv. Man.* ed. 1. p. 172.

ASPEROCOCCUS ? Laminariæ, *J. Ag. Sp. Alg.* vol. i. p. 79.

HAB. Parasitical on the fronds of *Alaria esculenta,* common on that plant in the summer and autumn. Annual.

GEOGR. DISTR. Atlantic shores of Europe.

DESCR. *Fronds* from a quarter to half an inch in length, cylindrical, slightly tapering at the base, then of nearly equal diameter upwards, and ending in a blunt point, smooth, or beset toward the summit with slender pellucid fibres, at first solid, becoming hollow in age from the perishing of the central cells. *Structure* built up of two or three or more layers of concentric cells; those of the outer circle, or periphery, about as long as broad, placed tier above tier in regular circles, so that the frond appears as if transversely striate or banded. The cells sometimes separate into four smaller cells, which occupy the space of one large cell. *Spores*? scattered, one or more in each transverse band, each spore formed from a cell of the band, become enlarged and prominent. *Colour,* when young, a clear olive, becoming brown in age. *Substance* soft, adhering to paper.

This poor little plant has been sadly tossed about among botanists from one part of the system to the other, nor is it yet very certain whether it will be allowed to bear the name under which it is now described, or whether that must be changed into *Desmotrichum.* Should it be found, on comparison, to agree in structure with the other species so named, our genus *Litosiphon,* which has been formed to include the present plant and the *Asperococcus pusillus,* Carm. (Pl. CCLXX.)*, must probably be given up. By Kützing these plants are, however, widely separated, *A. pusillus* being associated with the *Chlorosiphon Shuttleworthianus* of that author, a production which I regard as merely the very young state of *Chorda lomentaria.* I cannot consent to separate these parasites, which appear to me to have a close relationship and similar structure.

By its first discoverer our *L. Laminariæ* was placed in *Bangia,* which was then a common receptacle for any filiform plant marked with transverse, closely-set bands of cells. Here for a long time it was suffered to remain unmolested, though almost every author who subsequently described it agreed in pronouncing that it had no natural affinity with the type of the genus *Bangia,* and was even referable to a different *Series* or great division of the Algæ. Still no one, till recently, took any active step in the matter. Many years ago, Mr. David Moore remarked the affinity of *Bangia* ? *Laminariæ* with *Asperococcus pusillus,* and suggested the propriety of forming a genus for their reception, a suggestion which I recorded with approbation in the first edition of the Manual (p. 173), but did not then adopt. Mr. Moore is therefore properly the originator of the present generic group, to which I have now merely given a name.

Fig. 1. Portion of the frond of *Alaria esculenta,* with tufts of LITOSIPHON LAMINARIÆ growing on it:—*the natural size.* 2. Tuft of fronds. 3. Apex of a frond. 4. Base of the same. 5. Part of the middle portion of the same:—*all more or less highly magnified.*

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Plate CCXCI

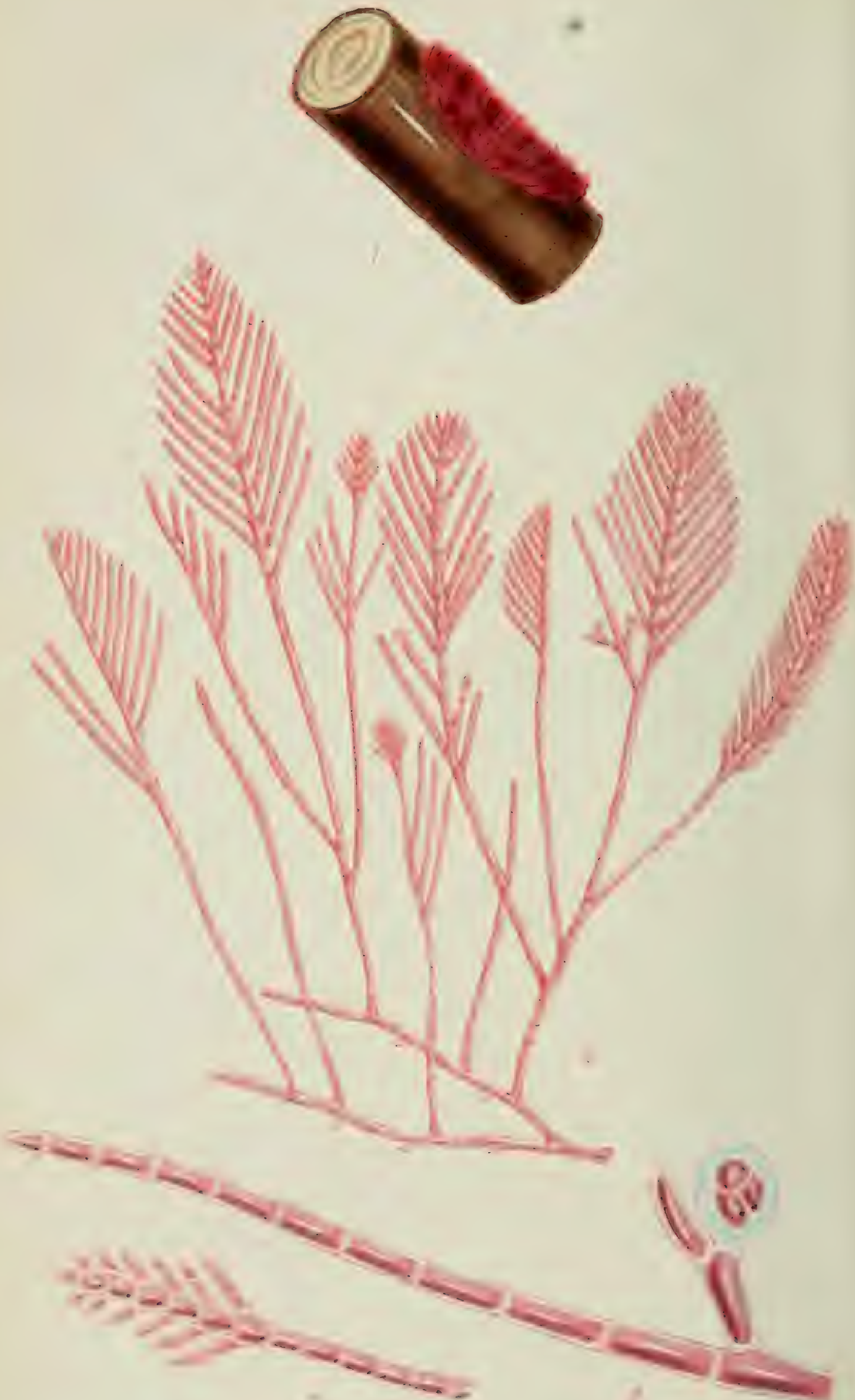

PLATE CCXCVI.

CALLITHAMNION PLUMA, *Ag.*

GEN. CHAR. *Frond* rosy or brownish-red, filamentous; stem either opake and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds, on distinct plants; 1, external *tetraspores* scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish, or lobed, berry-like *receptacles* (*favellæ*) seated on the main branches, and containing numerous angular spores. CALLITHAMNION (*Lyngb.*),—from καλλος, *beauty,* and θαμνιον, a *little shrub.*

CALLITHAMNION *Pluma*; stems rising from creeping filaments, erect, subsimple, or alternately branched; branches naked below, the upper half pinnated with short, erect, closely set, opposite ramuli; articulations from two to four times as long as broad; tetraspores globose, either terminating shortened pinnules, or placed on little stalks near the base of the pinnule.

CALLITHAMNION Pluma, *Ag. Sp. Alg.* vol. ii. p. 162. *Harv. in Hook. Br. Fl.* vol. ii. p. 340. *Harv. in Mack. Fl. Hib.* part 3. p. 217. *Harv. Man.* ed. 2. p. 173. *E. Bot. Suppl.* t. 2894. *Endl.* 3rd *Suppl.* p. 34. *Kütz. Sp. Alg.* p. 647.

CALLITHAMNION Plumula, β pusillum, *Lyngb. Hyd. Dan.* p. 127. t. 39.

CERAMIUM Pluma, *Ag. Syst.* p. 132.

CONFERVA Pluma, *Dillw. Conf.* p. 119. tab. F.

HAB. Parasitical on the stems of *Laminaria digitata,* rather rare. Annual. Summer. Bantry Bay, *Miss Hutchins.* Malbay, *W. H. H.* Appin, *Capt. Carmichael.* Probably overlooked on other parts of the coast.

GEOGR. DISTR. Atlantic shores of Europe.

DESCR. Forming velvety patches of some extent on the surface over which it spreads. *Fronds* rising from prostrate, creeping filaments, erect, from a quarter to half an inch or rather more in height, very slender, simple, or furnished with alternate or opposite, very erect branches: sometimes, in luxuriant specimens, almost bushy. *Branches* naked in their lower half, closely feathered above with opposite, erect, simple, straight ramuli, a pair of which issue from every articulation of the branch: ramuli, from suppression, sometimes alternate or secund. *Articulations* of the stem from three to four times longer than broad, of the branches shorter; those of the ramuli frequently scarcely exceeding their diameter in length. *Tetraspores* globose, either borne on short, proper pedicels, which rise, singly or in pairs, near the base of the pinnules, or terminating a shortened pinnule:

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in the former case each tetraspore is usually accompanied by a short unaltered cell or subtending ramulus. *Colour*, a fine, clear, crimson lake. *Substance* membranaceous, adhering to paper.

A beautiful little parasite, discovered originally by the late Miss Hutchins on the shores of Bantry Bay, and since detected in many distant points of the coast of Europe. It seems to be pretty much confined to the stems of *Laminaria digitata*, which it sometimes clothes in patches, looking like shreds of crimson velvet. Dillwyn's figure represents the upright stem as perfectly simple, the whole plant strictly resembling a little feather. I have sometimes met it so, but it is more usual to find one or two branches rising from the lower part, as shown in our figure. Among Capt. Carmichael's MSS. is a figure showing a much more compound state of this plant noticed by him on the west of Scotland, and this figure closely agrees with the description given by Lyngbye and Agardh of the species as it occurs in the north of Europe. *C. Pluma* is nearly allied to *C. Turneri*, from which it chiefly differs in the smaller size and shorter articulations, and in having the lower part of the stem and branches constantly naked.

Fig. 1. Patch of CALLITHAMNION PLUMA growing on the stem of *Laminaria digitata* :—*the natural size.* 2. Fronds from the same :—*magnified.* 3. Ramulus, with a *tetraspore.* 4. Apex of a young frond :—*both highly magnified.*

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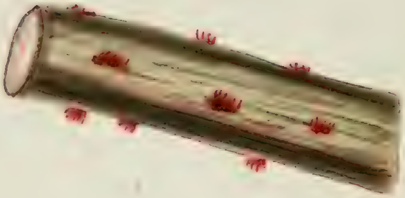
Plate CCXCVII.



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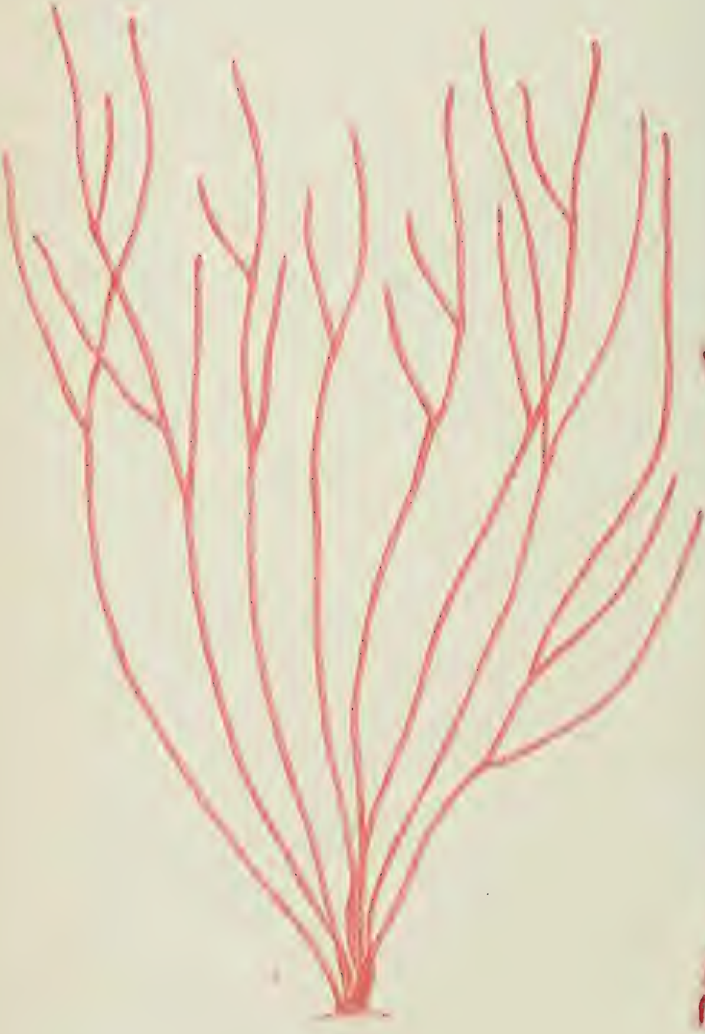

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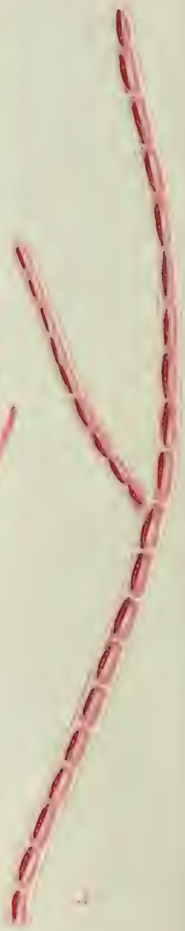

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PLATE CCXCVII.

CALLITHAMNION SPARSUM, *Harv.*

GEN. CHAR. *Frond* rosy or brownish-red, filamentous; stem either opake and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds on distinct plants: 1, external *tetraspores* scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like *receptacles (favellæ)* seated on the main branches, and containing numerous angular spores. CALLITHAMNION (*Lyngb.*), —from καλλος, *beauty,* and θαμνιον, a *little shrub.*

CALLITHAMNION *sparsum*; parasitical, minute; filaments tufted, scattered, sparingly branched; branches spreading, unequal; articulations twice or thrice as long as broad; tetraspores "obovate, sessile, mostly axillary." (*Carm.*)

CALLITHAMNION sparsum, *Harv. in Hook. Br. Fl.* vol. ii. p. 348. *Harv. Man.* ed. 2. p. 184. *Kütz. Sp. Alg.* p. 643.

CALLITHAMNION floridulum, *Lyngb. Hyd. Dan.* p. 130. t. 41. (*not of Phyc. Brit.*)

TRENTEPOHLIA sparsa, *Harv. in Mack. Fl. Hib.* part 3. p. 219.

HAB. On old stems of *Laminaria saccharina* at Appin, *Capt. Carmichael.* On *Cladophora rupestris* at Miltown Malbay, *W.H.H.*

GEOGR. DISTR. Shores of Greenland, *Gieseke.*

DESCR. *Fronds* forming small, scattered tufts, one or two lines in height and as much in diameter, composed of erect, closely-set filaments. *Filaments* nearly simple, or furnished with two or three simple, alternate or secund branches, equalling the main filament in diameter, cylindrical, obtuse. *Articulations* about once and a half as long as broad, with pellucid dissepiments. *Tetraspores* (which I have not seen) "obovate, sessile, mostly axillary." (*Carm.*) *Substance* membranaceous. *Colour* a clear crimson-red.

A minute and little known, but perhaps not uncommon species, in many respects allied to *C. Daviesii,* and in some approaching *C. Rothii,* but differing from both in the very simple filaments and flexuous branches. I have made my drawing from a part of Captain Carmichael's original specimen, preferring to use, in this instance, materials about which there could be no mistake; but I have not been able to find, on the portion examined, the axillary tetraspores which that observer describes. Such characters as the barren filaments supply are faithfully given in the annexed plate.

Fig. 1. Tufts of CALLITHAMNION SPARSUM, growing on an old stem of *Laminaria*:—*natural size.* 2. A few fronds from one of the tufts. 3. Portion of a branch:—*more or less magnified.*

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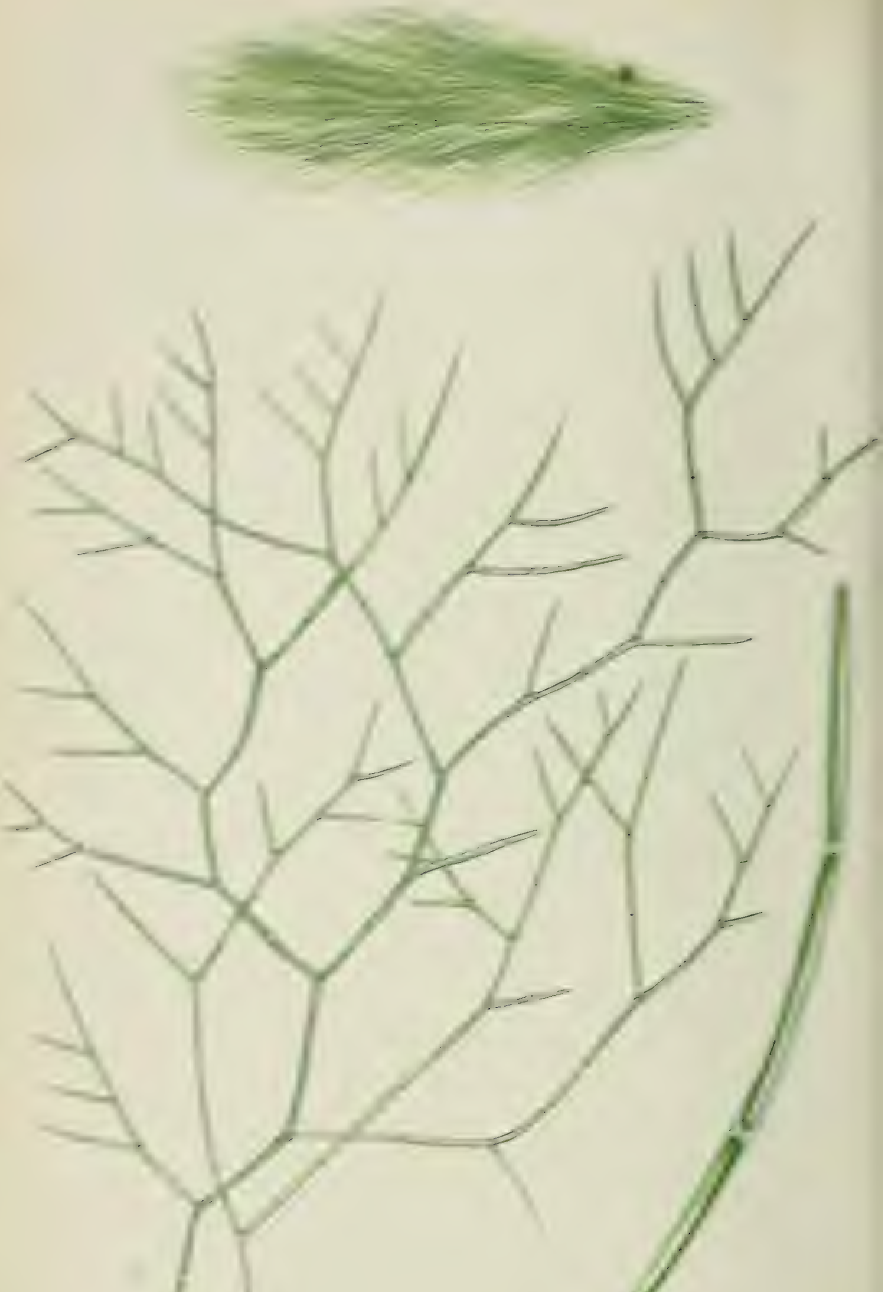

PLATE CCXCVIII.

CLADOPHORA FLAVESCENS, *Kg.*

GEN. CHAR. *Filaments* green, attached, uniform, branched, composed of a single series of cells or articulations. *Fruit,* aggregated granules or zoospores, contained in the articulations, having, at some period, a proper ciliary motion. CLADOPHORA (*Kütz.*),—from κλαδος, a *branch,* and φορεω, to *bear.*

CLADOPHORA *flavescens*; forming pale yellowish strata; filaments slender, sparingly branched; branches alternate or subdichotomous, erecto-patent, with scattered, elongate, alternate or secund ramuli; articulations from eight to nine times as long as broad.

CLADOPHORA flavescens, *Kg. Phyc. Gen.* p. 267. *Harv. Man.* ed. 2. p. 206. *Kg. Sp. Alg.* p. 402.

CONFERVA flavescens, *Roth. Cat. Bot.* vol. ii. p. 224. vol. iii. p. 241. *Fl. Germ.* vol. iii. pars 1. p. 511. *Dillw. Conf.* p. 64. t. E. *E. Bot.* t. 2088. *Ag. Syst.* p. 112?

HAB. In ditches or pools of brackish or fresh water. Annual. Summer.

GEOGR. DISTR. Europe.

DESCR. This species grows in continuous tufts, which, as they rise to the surface, form extensive floating strata covering the pool. *Filaments* slender, capillary, tangled together, irregularly branched; the main thread somewhat dichotomous, with widely-spreading axils, and often bent in an angular manner first to one side, then to the other: the lateral branches alternately divided, patent, with a few distant, scattered, alternate or secund ramuli. *Articulations* cylindrical, many times longer than broad, filled with a pale, granular endochrome. *Colour* when young a yellowish green, becoming yellower in age, and at last almost golden. When dry it has a silky appearance, and fades in the herbarium to a yellowish white. *Substance* soft, membranous, but not strongly adhering to paper.

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In a recent number we gave a figure of *Cladophora fracta*, a species nearly related to the plant now described, and inhabiting similar places. Both species frequently fill the pools in which they grow, and, rising in the water, cover the surface with a thick fleece, under which large bubbles of air, a portion of which is oxygen disengaged by the plant under the influence of light,
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are confined. *C. flavescens*, besides its paler green colour, is readily distinguished from *C. fracta* by the much longer articulations, and their less granular contents. The specimens published under the name of *C. flavescens* in Mrs. Wyatt's fasciculi are, in my copy at least, *C. fracta*.

Fig. 1. Tuft of CLADOPHORA FLAVESCENS:—*natural size*. 2. Portion of filaments, to show the branching. 3. Ramulus, to show the character of the articulations:—*both magnified*.

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Plate CCXC

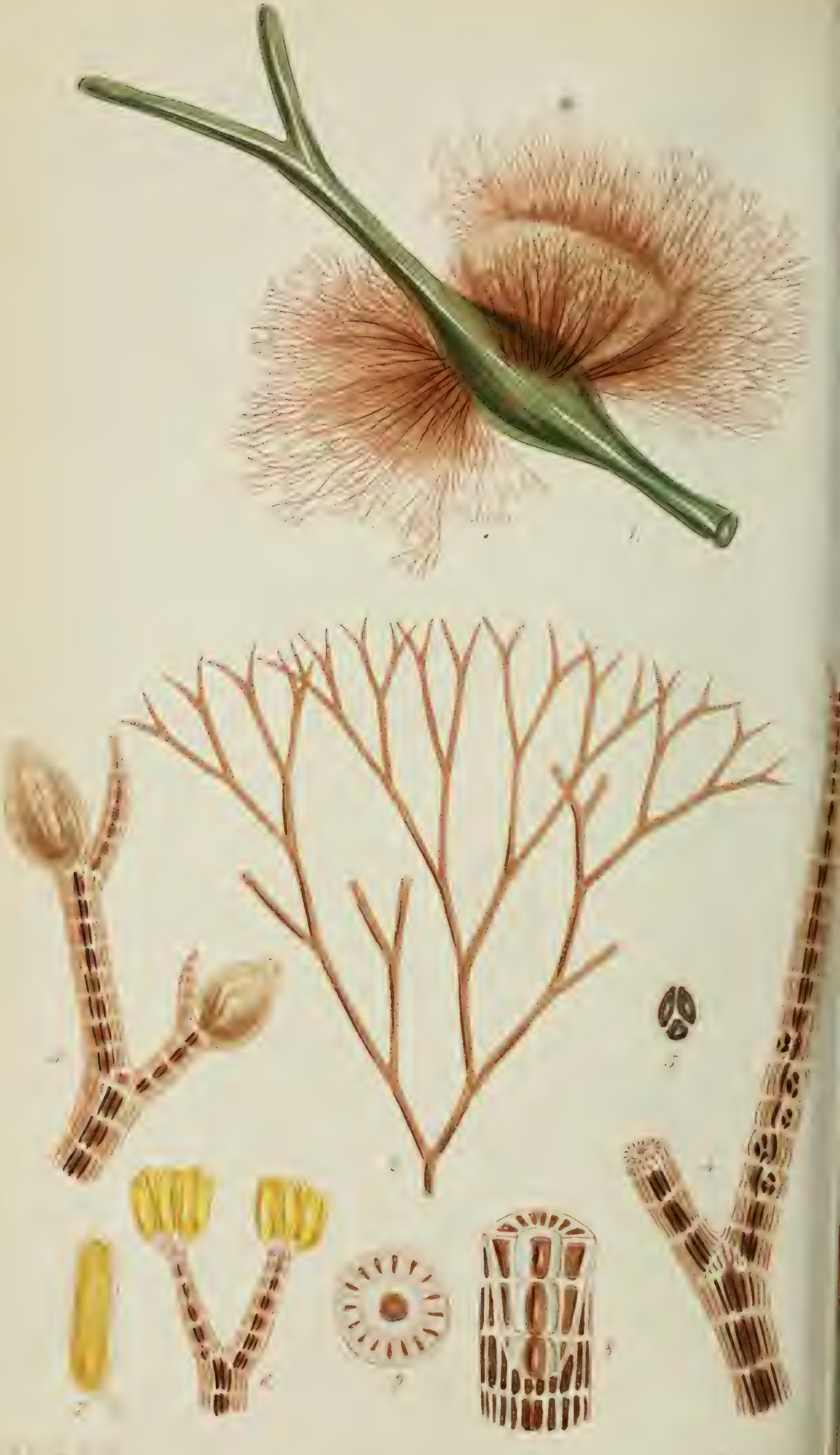

PLATE CCXCIX.

POLYSIPHONIA FASTIGIATA, *Grev.*

GEN. CHAR. *Frond* filamentous, partially or generally articulate; articulations longitudinally striate, composed of numerous, radiating cells or tubes, disposed round a central cavity. *Fructification* twofold, on different individuals: 1, ovate *capsules* (*ceramidia*) furnished with a terminal pore, and containing a tuft of pear-shaped spores; 2, *tetraspores,* imbedded in swollen branchlets. POLYSIPHONIA (*Grev.*),—from πολυς, *many,* and σιφων, a *tube.*

POLYSIPHONIA *fastigiata*; filaments rigid, setaceous, of equal diameter throughout, forming globular, fastigiate tufts, many times dichotomous; the axils patent; articulations shorter than their diameter, multistriate, with a dark central spot; siphons from sixteen to eighteen.

POLYSIPHONIA fastigiata, *Grev. Fl. Edin.* p. 308. *Harv. in Hook. Br. Fl.* vol. ii. p. 333. *Harv. in Mack. Fl. Hib.* part 3. p. 209. *Harv. Man.* ed. 2. p. 92. *Wyatt, Alg. Danm.* no. 177. *Endl. 3rd Suppl.* p. 45. *Kütz. Sp. Alg.* p. 809. *Kütz. Phyc. Gen.* p. 420. t. 50. f. 3.

HUTCHINSIA fastigiata, *Ag. Syn.* p. 53. *Hook. Fl. Scot.* part 2. p. 87. *Ag. Syst.* p. 154. *Lyngb. Hyd. Dan.* p. 108. t. 33. *Ag. Sp. Alg.* vol. ii. p. 67.

CERAMIUM fastigiatum, *Roth, Fl. Germ.* vol. iii. p. 463. *Cat. Bot.* vol. iii. p. 157.

CONFERVA polymorpha, *Linn. Syst. Nat.* vol. ii. p. 721. *Fl. Dan.* t. 395. *Dillen. Musc.* t. 6. fig. 35. *Ellis, Phil. Trans.* vol. lvii. p. 426. t. 18. fig. a. A. b. B. *Huds. Fl. Angl.* vol. ii. p. 599. *Lightf. Fl. Scot.* vol. ii. p. 989. *Dillw. Conf.* t. 44. *E. Bot.* t. 1764.

FUCUS lanosus, *Linn. Syst. Nat.* vol. ii. p. 718. *Huds. Fl. Ang.* vol. ii. p. 590.

HAB. Parasitical on the littoral *Fuci,* especially upon *Fucus nodosus.* Perennial. Summer and autumn. Very uncommon.

GEOGR. DISTR. Atlantic shores of Europe and North America. Baltic Sea.

DESCR. *Root* a minute disc. *Fronds* forming dense, globular, fastigiate tufts, from one to two or three inches in diameter. *Filaments* as thick as horsehair below, slightly attenuated upwards, excessively branched from the base, dichotomous, either bare of lateral ramuli or furnished with a greater or less number, which are short and once or twice forked. *Apices* spreading, of nearly equal length, subulate; axils acute. Articulations shorter than their length, with hyaline dissepiments, many-striate and marked with a dark, central spot, being a bag of coloured endochrome which fills the central tube or cavity of the frond: radiating cells from sixteen to eighteen. *Capsules* ovate, near the tips of the branches, formed from the metamorphosis of one of the prongs of the terminal forks. *Tetraspore* immersed in the terminal ramuli. *Antheridia* abundant in winter and spring, bright yellow, crowded close to the ends of the branches, oblong, affecting the colour of the tuft by their abundance. *Substance* rigid, not adhering to paper, except after long steeping. *Colour* a rich vandyke brown, becoming foxy in age or decay.

A very common species on the shores both of Europe and of North America, almost invariably infesting *Fucus nodosus* with its dark brown bushy tufts. Occasionally I have seen it growing on *F. serratus* and *F. vesiculosus*, but it is much less common on them. On the contrary, wherever *F. nodosus* occurs, there it is accompanied by this parasite. *Pol. fastigiata* grows nearer to high-water mark than any others of the genus, and is generally exposed, for many hours of each tide, to the influence of the air. This exposure and the constant alternation of circumstances probably influence the colour of its frond, and we accordingly find that it partakes of the *brown* tints of the *Fuci* among which it grows, almost to the entire extinction of the red colour, proper to the family to which its structure allies it. Besides this difference of colour, it differs from most others of its genus in having a cell, containing endochrome, within each articulation of the central or axial tube. In this respect it partakes of the character of *Bostrychia*, with which genus its colour and habitat strongly connect it. The *antheridia* are particularly abundant and of large size; and at the season when they are developed the tufts become of a yellow or orange colour. Almost every point of the branches bears its tuft.

It is difficult to account for the specific name, *polymorpha*, under which it was designated by Linnæus, for few species among the marine Algæ are less inconstant in character.

Fig. 1. Tufts of POLYSIPHONIA FASTIGIATA growing on *Fucus nodosus*:—*the natural size*. 2. Portion of a frond, to show branching. 3. Ceramidia. 4. Branchlet with imbedded tetraspores. 5. A tetraspore. 6. Apices with antheridia. 7. An antheridium. 8. Portion of a frond, partly cut longitudinally to show the internal structure. 9. A transverse section of a frond:—*all magnified*.

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Plate CC

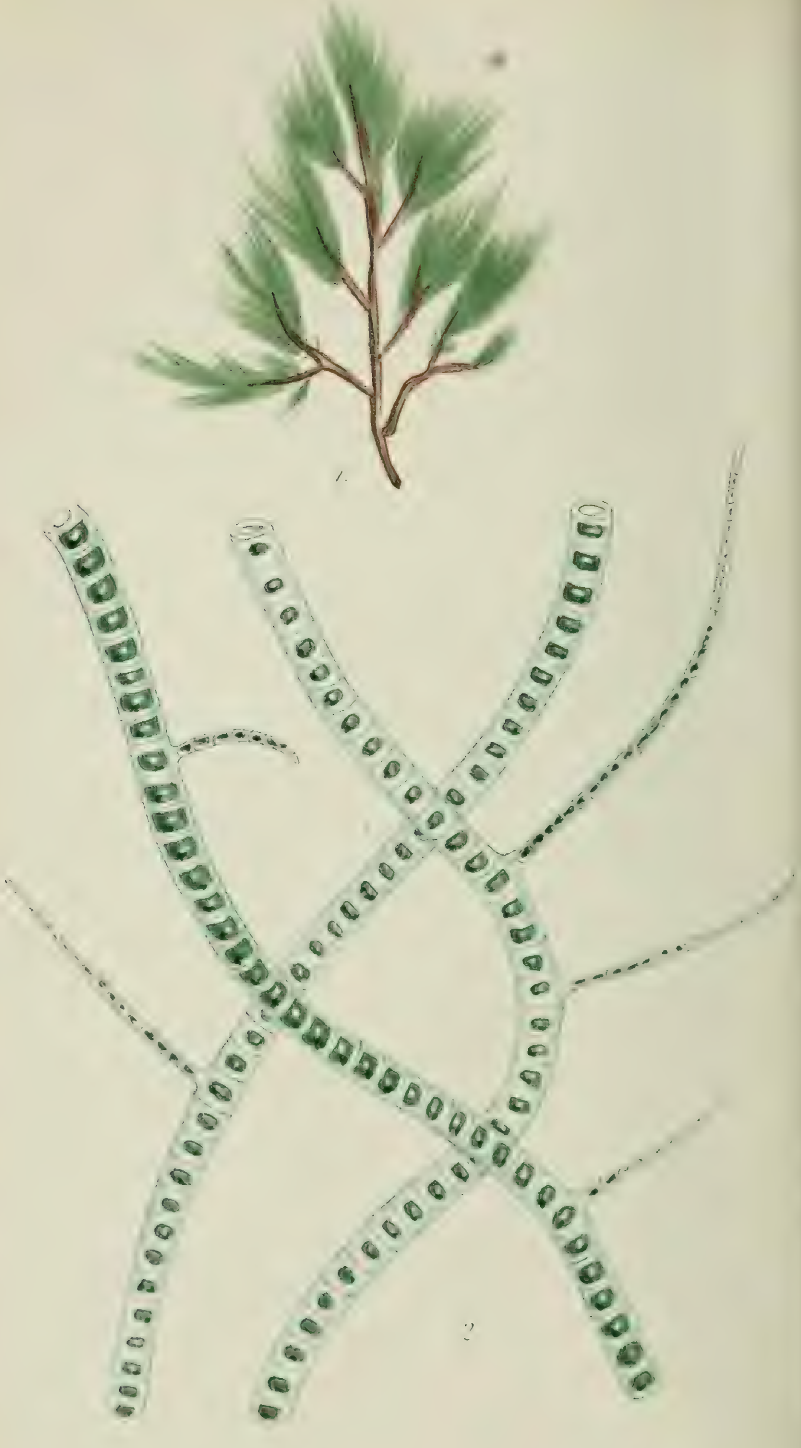

PLATE CCC.

LYNGBYA? FLACCA, *Harv.*

GEN. CHAR. *Filaments* destitute of a mucous layer, free, flexible, elongated, decumbent, not oscillating. *Tube* continuous; endochrome green or purple, densely annulated and finally separating into lenticular sporidia. LYNGBYA (*Ag.*),—in honour of *Hans Christian Lyngbye,* author of an excellent work on the Algæ of Denmark.

LYNGBYA? *flacca*; filaments short, tufted, straight or gently curved, simple, or having a few slender, proliferous, subulate, root-like ramuli, articulated; articulations shorter than their diameter, the endochrome at length contracting into a small central sporidium.

LYNGBYA? flacca, *Harv. in Phyc. Brit. list,* vol. i. p. xv. *Harv. Man.* ed. 2. p. 227.

HORMIDIUM flaccum, *Kütz. Phyc. Gen.* p. 244.

HORMOTRICHUM flaccum, *Kütz. Sp. Alg.* p. 381.

CONFERVA flacca, *Dillw.* t. 49. *E. Bot.* t. 1943. *Harv. in Hook. Br. Fl.* vol. ii. p. 354. *Harv. Man.* ed. i. p. 131.

HAB. Parasitical on various small Algæ in tide-pools; on the *Fuci,* and growing also on floating timber. Annual. Summer. Not uncommon.

GEOGR. DISTR. Atlantic shores of Europe.

DESCR. *Filaments* from half an inch to an inch and a half in length, forming wide patches on floating timber, or covering various algæ with a silken beard, fixed at base, freely floating in the water; straight or gently curved, either quite simple or throwing out, here and there, a few slender, subulate, root-like processes, which seem to be a viviparous growth of the sporidium contained within the tube. *Articulations* rather well defined, shorter than their diameter, with a wide border; the endochrome at first filling the cell, but soon contracted, and then forming a small lenticular sporidium in the centre of the transparent articulation. *Colour* a beautiful grass-green. *Substance* lubricous and soft, closely adhering to paper in drying.

In the last edition of the Manual I have divided the genus *Lyngbya* into two sections, to the latter of which the species now described belongs, as well as *L. Carmichaelii* and *L. speciosa,* which have already been figured in this work. A better course would probably have been to have adopted Kützing's genus *Hormotrichum* for this latter group, adding to it, as that author has done, *Conferva bangioides*, *C. Youngana*, and probably *C. collabens*, a species of which but little is yet known. In any future work I should probably bring these species together under one generic head, as they certainly have characters in common with each other, and such of them as have, like the present, been classed with the *Lyngbyæ* differ from the type of that genus in having a distinctly articulated filament.

I have frequently observed *C. flacca* put forth the root-like, proliferous branches given in our plate.

Fig. 1. Tufts of LYNGBYA FLACCA growing on *Hypnea purpurascens*:—*natural size*. 2. Portions of filaments from the same:—*highly magnified.*

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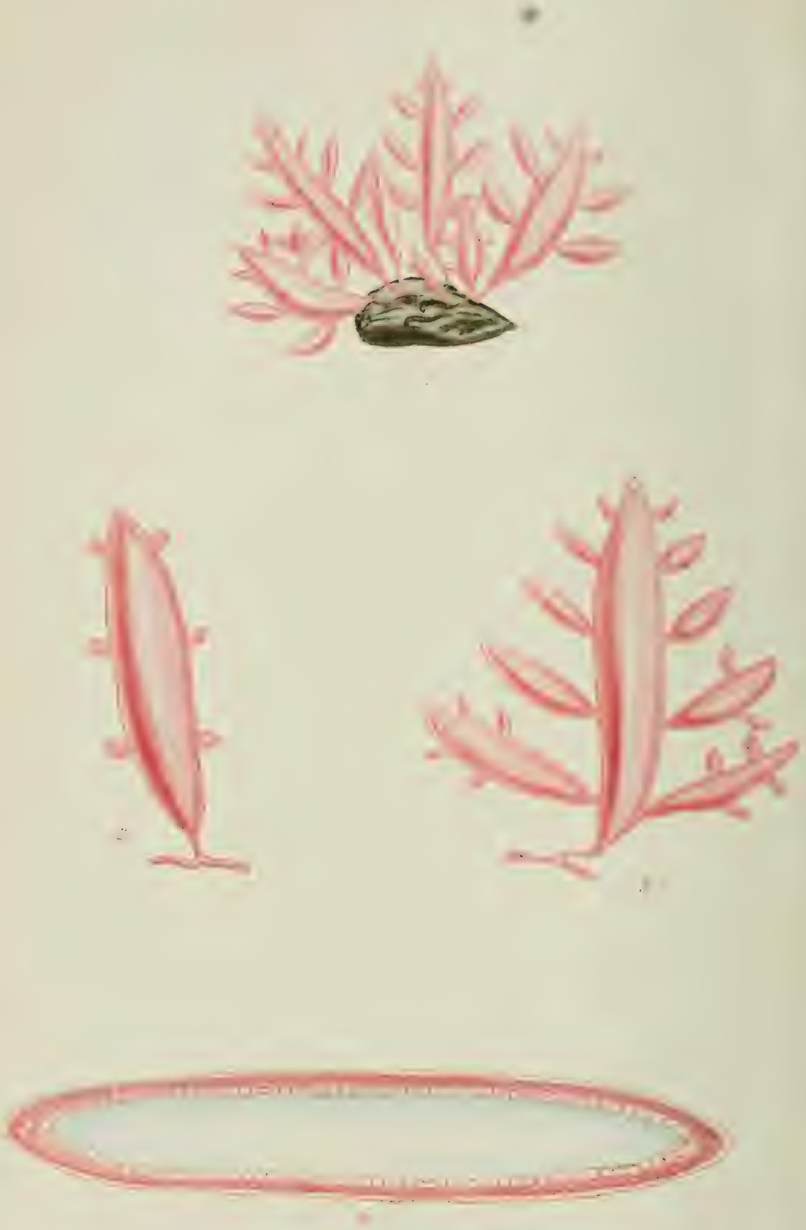
Plate CCCI



W. H. H. del et lith

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PLATE CCCI.

CHRYSYMENIA ROSEA,

Var. ORCADENSIS, *Harv.*

GEN. CHAR. *Frond* tubular, continuous (not constricted or jointed), filled with a watery juice, and traversed by a few longitudinal filaments; its walls composed of several rows of cells, the innermost of which are distended and much elongated, the outer gradually smaller, and the superficial ones very minute. *Fructification*: 1, *ceramidia*, containing a very dense tuft of angular spores; 2, triparted *tetraspores*, immersed in the ramuli. CHRYSYMENIA (*J. Ag.*),—from χρυσεος, *golden*, and ὑμην, a *membrane*; because the species assume golden tints if steeped for some time in fresh water.

CHRYSYMENIA *rosea*, var. *Orcadensis*; fronds distichous, pinnate, or bipinnate, the main stem and the pinnæ and pinnules elliptic-oblong, compressed; pinnæ opposite.

CHRYSYMENIA Orcadensis, *Harv. Man.* ed. 2. p. 100.

HAB. On rocks and Algæ in deep water. Annual? At Skaill, Orkney, *Miss Watt*. On a root of *Laminaria digitata*, adhering to a large stone, dredged in eight fathoms, Sanda Frith, Orkney (growing with *Rhodymenia cristata*), *Messrs. Thomas and M'Bain.*

GEOGR. DISTR. Only known in the above localities.

DESCR. *Root* fibrous, branching. *Fronds* (in the only specimens yet seen) from three-quarters of an inch to an inch and a half in height, a quarter of an inch in breadth, compressed, undivided, oblong, rounded, or bluntly pointed, but not attenuated at the summit, once or twice pinnate with similarly-shaped frondlets. *Frondlets* opposite, at first ovate, becoming oblong as they grow, distichous. *Substance* delicately membranaceous, closely adhering to paper. *Colour* a bright rosy red, preserved in drying. *Fructification* unknown.

When the plate now given was prepared and lithographed, I was only acquainted with the few imperfect specimens first discovered, and noticed, under the provisional name "*Orcadensis*," in the recently published edition of the 'Manual'; but within the last month (August) two obliging correspondents, Mrs. Gatty and Mrs. Hayden, have communicated more perfect specimens gathered at Filey, on the Yorkshire coast, in July 1850, which seem to connect the Orkney plant with an American species gathered at Newport, Rhode Island, to which I had previously given the name "*rosea.*" The Orkney plant, here figured and described, if not a distinct species, is still so much broader than either the American or the Yorkshire plants that it may be retained as a well-marked variety. Our figure is, however, so imperfectly characteristic of the species, that another will be desirable, which we trust to give before the close of the work, and, to afford time for discovery, both to our Orkney and Yorkshire friends, shall defer it to the latest practicable period.

Mrs. Gatty's largest specimen, most kindly placed at our disposal, so nearly resembles one of the American specimens that it might have been supposed to be from the same locality; while Mrs. Hayden's in its rather broader frond approaches the Orkney form. Mere *breadth* of frond is an uncertain character: a better distinction between this species and *C. clavellosa* lies in the more elliptical and obtuse ramuli, which are greatly more constricted at the insertion. Another character is pointed out by Mrs. Gatty, whose specimen bears tetraspores,—namely, that these are collected into several distinct *sori*, not dispersed through the branchlets, or forming one general sorus.

Fig. 1. Plants of CHRYSYMENIA ROSEA, var. ORCADENSIS:—*the natural size.*
2. A young frond:—*slightly enlarged.* 3. An older frond:—*the same.*
4. Transverse section of the frond:—*highly magnified.*

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Plate CCCII.

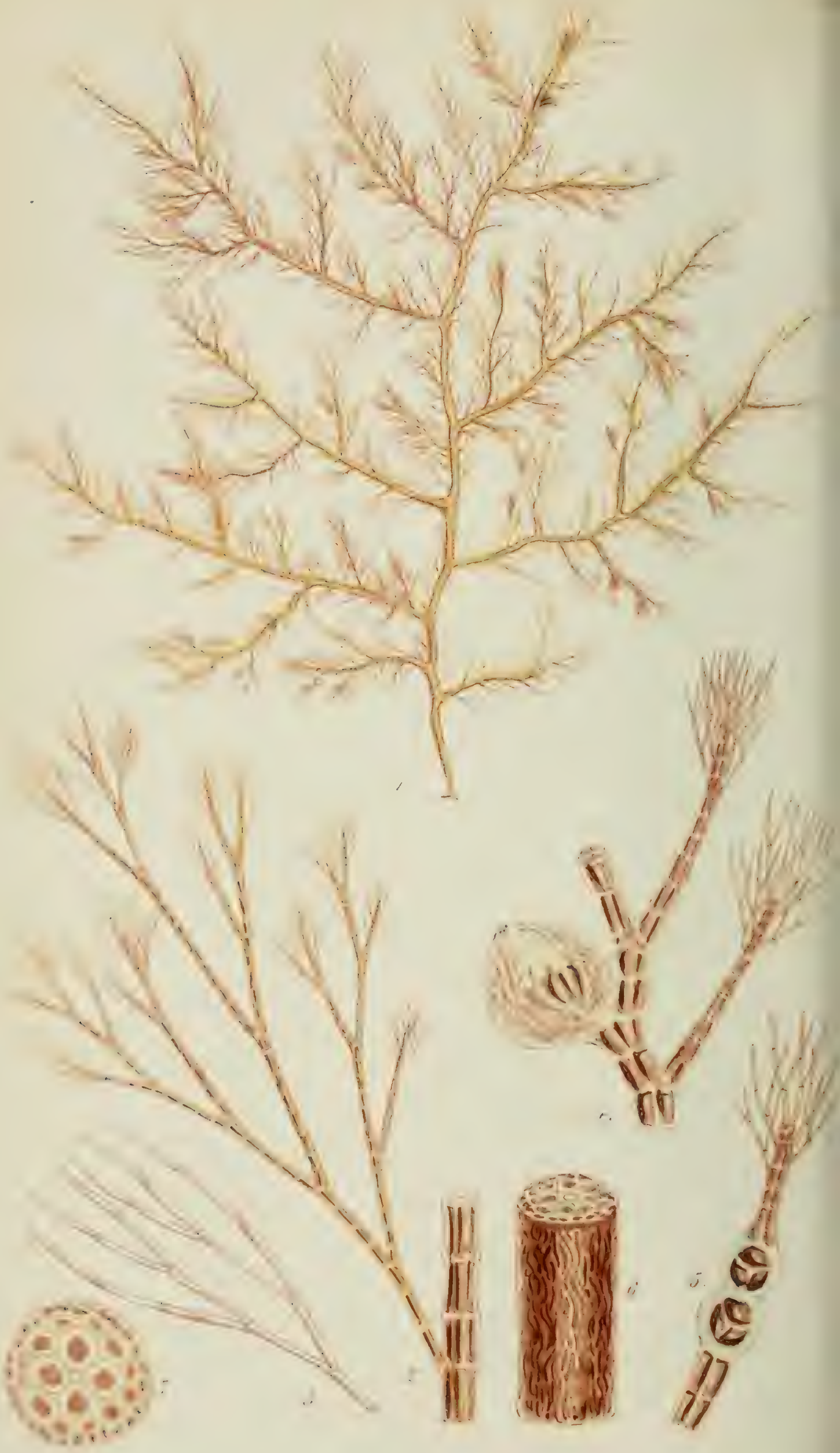

Plate CCCII.

POLYSIPHONIA FIBRILLOSA, *Grev.*

Gen. Char. *Frond* filamentous, partially or generally articulate; articulations longitudinally striate, composed of numerous, radiating cells or tubes, disposed round a central cavity. *Fructification* twofold, on different individuals: 1, ovate *capsules* (*ceramidia*) furnished with a terminal pore, and containing a tuft of pear-shaped spores; 2, *tetraspores,* imbedded in swollen branchlets. Polysiphonia (*Grev.*),—πολυς, *many,* and σιφων, a *tube.*

Polysiphonia *fibrillosa;* pale straw-colour or brownish; stems inarticulate, opake, with sinuous veins, robust, alternately branched; branches spreading, resembling the stem, but less opake, articulated towards the apices, subsimple, thickly set with very slender, articulated, finely divided, short ramuli, whose tips are copiously fibrilliferous; articulations of the ramuli rather longer than broad, 2–3-striate; siphons four, in the stem surrounded by a thick wall of small cells; capsules broadly ovate; tetraspores large, in distorted terminal ramuli.

Polysiphonia fibrillosa, *Grev.—Harv. in Hook. Br. Fl.* vol. ii. p. 334. *Harv. Man.* ed. 2. p. 87. *Wyatt, Alg. Danm.* no. 136. *Endl. 3rd Suppl.* p. 46. *J. Ag. Alg. Medit.* p. 138. *Kütz. Sp. Alg.* p. 827. *Kütz. Phyc. Gen.* p. 427.

Hutchinsia fibrillosa, *Ag. Sp. Alg.* vol. ii. p. 78. *Lyngb. Hyd. Dan.* p. 113.

Hutchinsia lubrica, *Ag. l. c.* p. 94 *(fide J. Ag.)*

Hutchinsia pilosa, *Nacc. (fide J. Ag.)*

Conferva fibrillosa, *Dillw.! Syn.* p. 86. t. G.

Hab. On rocks and stones, and on *Algæ,* chiefly in clear, sunny pools left by the falling tide. Annual. Summer. Frequent on the British coasts.

Geogr. Distr. Atlantic shores of Europe. Baltic and Mediterranean Seas.

Descr. *Root* a small disc. *Fronds* solitary or tufted, not densely aggregated, from six to eight or ten inches in length, often twice the diameter of hog's bristle in the lower part, attenuated upwards; sometimes of half these dimensions or less. *Stem* either undivided, running through the frond, or once or twice parted into a few principal branches, naked for a short way above the base, then furnished with closely-placed lateral branches for the whole remaining length. *Branches* widely spreading or horizontal, robust like the stem, the lowermost longest, the rest gradually shorter, repeatedly and decompoundly branched alternately, each younger set of branches more slender than the rest, till the ultimate divisions are finer than hair. In large and old specimens the series of lesser branches are sometimes as many as six or eight, when the plant becomes exceedingly feathery and delicate. *Stem* and branches opake, without visible articulations, coated with sinuous, narrow veins; lesser branches toward the upper part gradually more clearly jointed, with swollen joints, the articulations once and a half to twice as long as broad; small branches and ramuli all pellucidly articulate, two-tubed, with short joints; their tips copiously clothed with dichotomous fibrils. A cross section of the stem shows four large tubes, surrounding a minute cavity and clothed externally with a broad stratum of cells; all coloured. *Capsules* ovate, scattered over the lesser branches and generally sessile. *Tetraspores* large, imbedded in the ramuli. *Colour*, when growing (as the plant often does) in sunny pools, a pale straw-yellow; when developed in darker places, more or less deeply brown: in drying it becomes always darker and usually of a rich reddish-brown. *Substance* cartilaginous in the stem, very soft and gelatino-membranaceous in the ramuli. It closely adheres to paper in drying, and soon decomposes in fresh water or the air.

A common plant, subject to many variations in form, but generally recognized by its somewhat clumsy, unjointed stems, and short, soft, and gelatinous ramuli copiously fibrillose at the tips. It is most nearly related to *P. violacea*, with which alone can it well be confounded, and from which it chiefly differs in its shorter and less multifid ramuli, duller colour, and shorter articulations; but there are specimens occasionally found which seem almost to connect these two species together.

I have not enumerated the continental *P. allochroa* among the synonyms, not having examined an authentically named specimen of that species; but what I have received from several correspondents under that name does not appear to me to differ essentially from *P. fibrillosa* of British authors.

Fig. 1. POLYSIPHONIA FIBRILLOSA:—*the natural size.* 2. A small branch. 3. Fibril from one of the tips of the same. 4. Branchlets with a capsule. 5. Branchlet with tetraspores. 6. Portion of the lower part of the stem. 7. Transverse section of the same.

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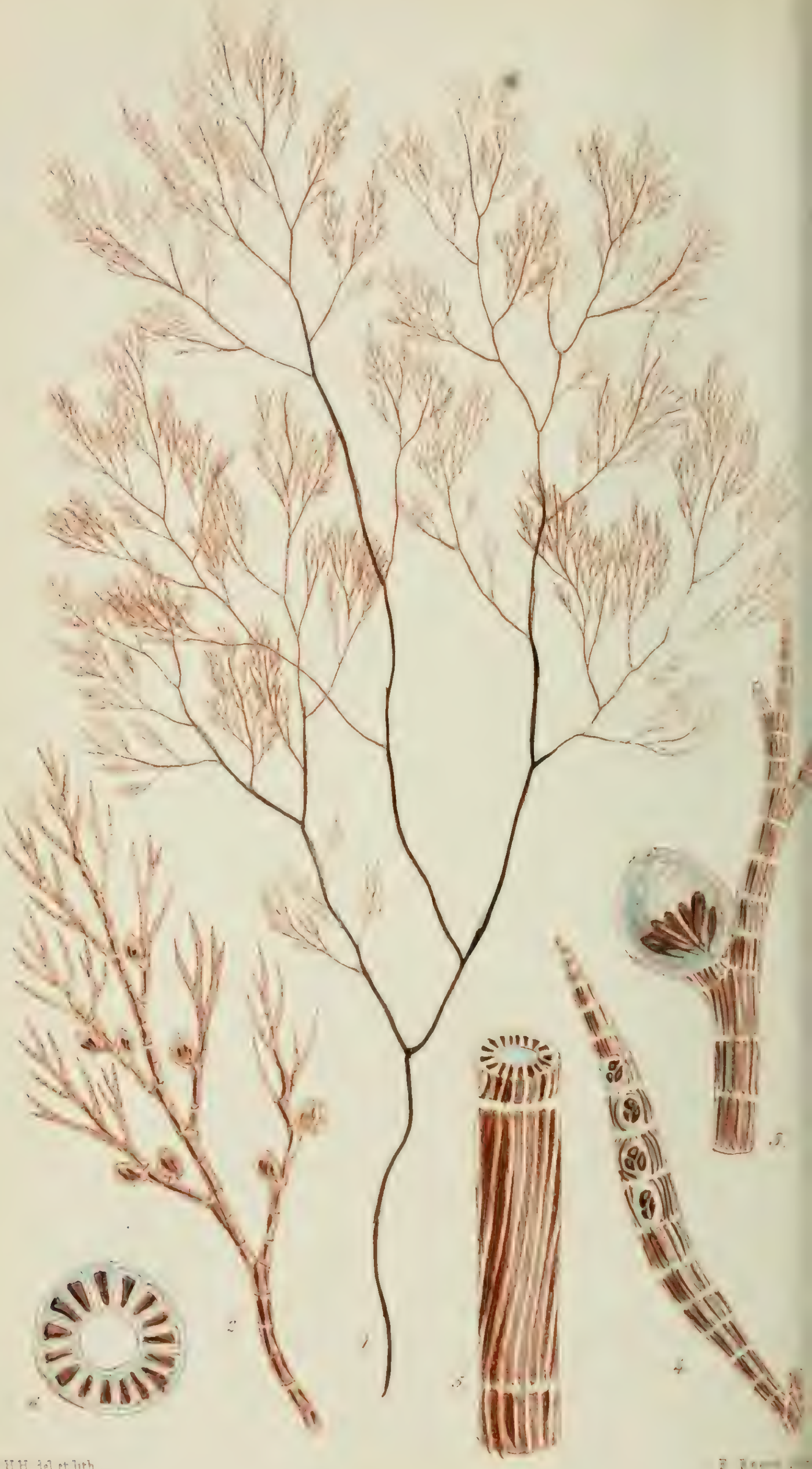
Plate CCC



W.H.H. del et lith.

F. Reeve

PLATE CCCIII.

POLYSIPHONIA AFFINIS, *Moore.*

GEN. CHAR. *Frond* filamentous, partially or generally articulate; articulations longitudinally striate, composed of numerous, radiating cells or tubes, disposed round a central cavity. *Fructification* twofold, on different individuals: 1, ovate *capsules* (*ceramidia*) furnished with a terminal pore and containing a tuft of pear-shaped spores; 2, *tetraspores* imbedded in swollen branchlets. POLYSIPHONIA (*Grev.*),—from πολυς, *many*, and σιφων, a *tube.*

POLYSIPHONIA *affinis*; filaments robust, elongated, cartilaginous below, flaccid above, irregularly divided; branches patent, naked at base, multifid and with an ovate outline above; ramuli very erect, simple or divided, acute; articulations multistriate, the lower two or three times longer, the upper as long as broad; siphons about sixteen; ceramidia ovate, stalked or subsessile.

POLYSIPHONIA affinis, *Moore in Ord. Surv. Londonderry, Appendix*, p. 11. t. 7. *Harv. Man.* ed. 2. p. 90.

HAB. On rocks, &c., in the sea, thrown up from deep water. Carnlough, near Glenarm, *Dr. Drummond.* Cushendall, *Mr. Moore.* (*W.H.H.*, 1850.)

GEOGR. DISTR. —— ?

DESCR. *Root* a small disc. *Fronds* as thick as hog's bristle at base, attenuated upwards, six or eight inches long or more, divided irregularly, or subdichotomously into a few principal branches, or alternately branched; branches long, spreading, bare of ramuli in the lowest part, more or less copiously furnished with short branches above; these lesser branches are one or two inches long, with a broadly ovate outline, naked below, multifid above, the lesser divisions repeatedly pinnate, all the divisions alternate. The tendency to branch only at the upper portion of each rachis is equally characteristic of the ultimate divisions as of the primary and secondary. *Articulations* of the stem and branches twice or thrice as long as broad; of the ramuli shorter, with pellucid dissepiments; siphons about sixteen. *Capsules* ovate or subglobose, on short stalks or subsessile. *Tetraspores* large, in the ultimate ramuli, which are then distorted. *Colour* varying from a pale to a dark reddish-brown. *Substance* of the stem cartilaginous, of the upper portion flaccid, and closely adhering to paper.

Very closely related to *P. nigrescens*, from which it chiefly differs in the greater length of the articulations of the stem, rather a variable character; and in the smaller number of siphons in each whorl. The ramification is somewhat more lax; the spaces of naked branch at the bases of the branching portion are longer; the filaments are more flexuous and flaccid, and the colour is usually paler than in *P. nigrescens*, but there is such a general similarity that I could be well contented to regard it as a deep-water form of that species. I have endeavoured, in the accompanying plate drawn from one of Mr. Moore's original specimens, to show all the characters proper to the species. *P. affinis* was first observed, some twenty years ago, on the coast of Antrim by Dr. Drummond of Belfast, and was soon afterwards found, in considerable plenty on the same coast, at a station a few miles distant by Mr. Moore, and was by the latter gentleman described and figured in the Survey Report of Londonderry. In the present year (1850) I collected a few specimens in Mr. Moore's locality.

Fig. 1. POLYSIPHONIA AFFINIS:—*the natural size.* 2. Small branch, with capsules. 3. Portion of the same. 4. A ramulus with imbedded tetraspores. 5. Articulations of the stem. 5. Transverse section of the stem: —*all magnified.*

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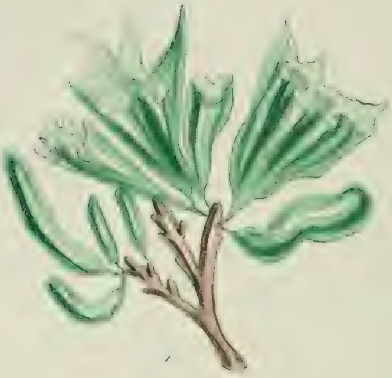
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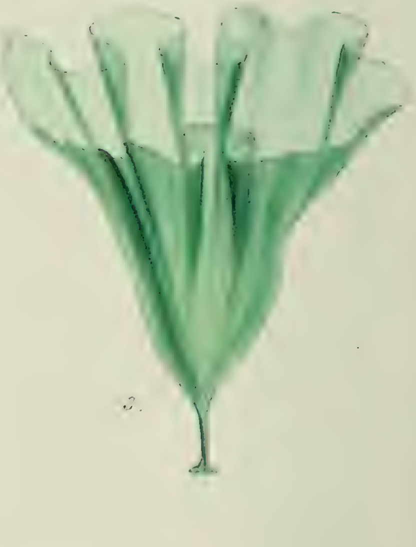
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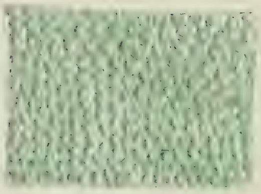
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W. H. H. del. et lith.

F. Reeve, imp.

PLATE CCCIV.

ENTEROMORPHA CORNUCOPIÆ, *Hook.*

GEN. CHAR. *Frond* tubular, membranaceous, of a green colour, and reticulated structure. *Fructification,* granules, commonly in fours, contained in the cellules of the frond. ENTEROMORPHA (*Link*),—from *εντερον,* an *entrail,* and *μορφη,* *form* or *appearance.*

ENTEROMORPHA *Cornucopiæ*; gregarious, small; fronds stipitate, tubular at the base, suddenly dilated, widening upwards, plaited and laciniate at the margin.

ENTEROMORPHA Cornucopiæ, *Hook. Br. Fl.* vol. ii. p. 313. *Harv. Man.* ed. 2. p. 213.

SCYTOSIPHON intestinalis, γ. cornucopiæ, *Lyngb. Hyd. Dan.* p. 67.

SOLENIA intestinalis, γ. cornucopiæ, *Ag. Syst.* p. 185.

ULVA intestinalis, γ. cornucopiæ, *Ag. Sp. Alg.* vol. i. p. 419. *Wahl. Fl. Lapp.* p. 505. *Kütz. Sp. Alg.* p. 478.

HAB. On corallines, &c., in rocky pools left by the tide. Annual. Spring and Summer. Appin, *Capt. Carmichael.* Marwick, Orkney, *Messrs. Thomas and M'Bain.*

GEOGR. DISTR. Shores of Northern Europe.

DESCR. *Root* a minute, scutate disc. *Fronds* from an inch to an inch and a half in height, with a distinct filiform stem, about a line in length, at the summit of which the tube suddenly enlarges and becomes saccate, and then gradually increases in diameter upwards. When young the frond is a closed sac; at a later period the apex bursts, the frond then becomes funnel-shaped, and jagged and plaited at the margin. *Substance* delicately membranaceous. *Structure* cellular; the cells quadrate, something larger than in *E. intestinalis. Colour* a pleasant grass-green.

Had not this plant been admitted to the rank of a species by the late Capt. Carmichael, than whom few naturalists have more carefully studied this variable genus, I should have been contented to regard it, with continental authors, as a dwarf variety of *E. intestinalis.* Capt. Carmichael says, "Without pushing the system of varieties to an extravagant length, this plant cannot be considered as a variety of *E. intestinalis*; the characters of the definition mark it as abundantly distinct, and to these characters it is universally constant. I look upon it, indeed, as a much more distinct species than *E. compressa*, specimens of which occur, now and then, very difficult to be distinguished from *E. intestinalis*."—*Carm. in Hook. Br. Fl.* vol. ii. p. 313.

Fig. 1. ENTEROMORPHA CORNUCOPIÆ, fronds of various ages, growing on *Laurencia pinnatifida*:—*the natural size*. 2. A young, and 3, an old frond:—*slightly enlarged*. 4. Small portion of the membrane:—*highly magnified*.

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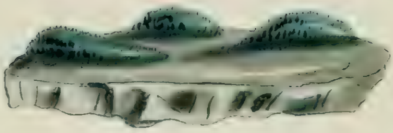
Plate CCCV.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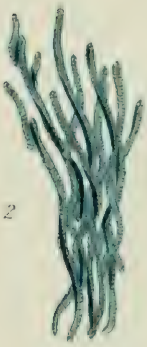
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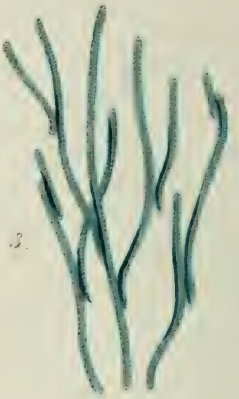
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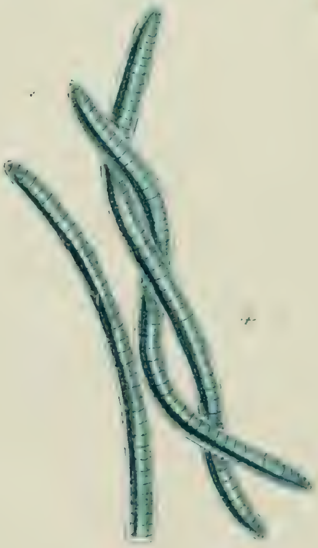
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W.H.H. del et lith.

F. Reeve, imp.

PLATE CCCV.

CALOTHRIX CÆSPITULA, *Harv.*

GEN. CHAR. *Filaments* destitute of a mucous layer, erect, tufted or aggregated, fixed at the base, somewhat rigid, not oscillating. *Tube* continuous; endochrome green, densely annulated, at length dissolved into lenticular sporidia. CALOTHRIX (*Ag.*),—from καλος, *beautiful*, and θριξ, a *hair*.

CALOTHRIX *cæspitula*; filaments forming close, convex, blackish-green tufts, densely packed, flexuous, flaccid, obtuse, not attenuated, here and there spuriously branched: border of the filaments narrow.

CALOTHRIX cæspitula, *Harv. in Hook. Br. Fl.* vol. ii. p. 369. *Harv. in Mack. Fl. Hib.* part 3. p. 237. *Harv. Man.* ed. 2. p. 225.

LEIBLEINIA cæspitula, *Kg. Sp. Alg.* p. 278.

HAB. Marine rocks, near high-water mark. Annual? Summer. Miltown Malbay, 1831. (*W.H.H.*)

GEOGR. DISTR. —— ? Adriatic (*Kützing*).

DESCR. *Tufts* very convex, from a quarter inch to an inch and a half in diameter, hemispherical or irregular in outline, deep blackish-green, flaccid, yielding to the touch, growing either on the naked rock or on corallines, shells, &c. *Filaments* densely packed together, often twisted round each other in small bundles, either simple or appositionally branched, obtuse, cylindrical, not tapering to either end; branches erect. *Endochrome* dense, filling the tube; the striæ dense and strongly marked; border narrow.

I can say but little respecting this species, although I am responsible for having originally given it a name. The specimens gathered by me in 1831,—from one of which, assisted by a sketch made at the time from the fresh plant, the plate now given has been prepared,—were collected in rock pools of salt water into which the sea only flows at spring tides, situated at the extremity of "Spanish Point," Miltown Malbay. I have repeatedly sought for the plant on subsequent visits to the west coast, but never successfully, nor have I received specimens from any correspondent. The only continental author who has noticed this plant is Kützing, who describes what he regards as the same from the shores of the Adriatic, but it would be satisfactory to have specimens from each locality compared together before deciding on their identity.

Fig. 1. Tufts of CALOTHRIX CÆSPITULA, growing on a piece of rock:—*the natural size.* 2. Portion of the tuft. 3. Part of the same, more separated:—*both magnified.* 4. Filaments:—*more highly magnified.*

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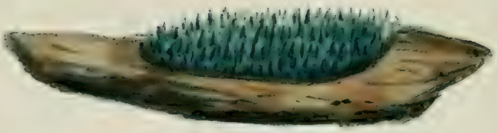

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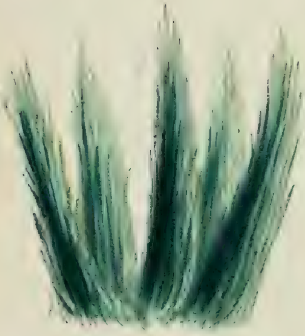

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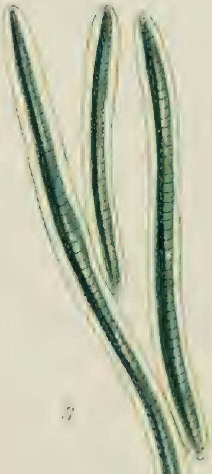

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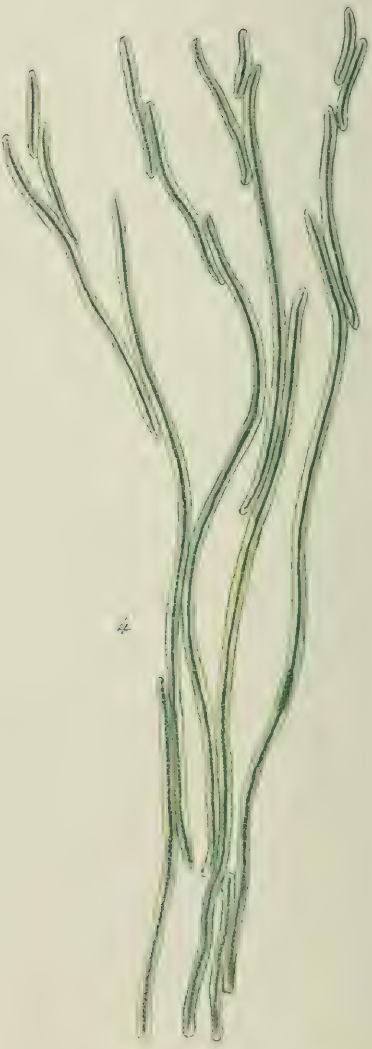

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W. H. H. del et lith.

[illegible] imp.

PLATE CCCVI.

CALOTHRIX HYDNOIDES, *Carm.*

GEN. CHAR. *Filaments* destitute of a mucous layer, erect, tufted or aggregated, fixed at the base, somewhat rigid, not oscillating. *Tube* continuous; endochrome green, densely annulated, at length dissolved into lenticular sporidia. CALOTHRIX (*Ag.*),—from καλος, *beautiful*, and θριξ, a *hair*.

CALOTHRIX *hydnoides*; patches widely spreading, flattish, dark olive-green; filaments elongated, flexuous, cylindrical, obtuse, interwoven below, their tips cohering in rigid, erect, tooth-like bundles; border of the filament wide, pellucid.

CALOTHRIX hydnoides, *Carm. in Hook. Br. Fl.* vol. ii. p. 369. *Harv. Man.* ed. 2. p. 225.

SCYTONEMA hydnoides, *Carm. Algæ Appinenses*, MSS. cum icone.

SYMPLOCA hydnoides, *Kg. Sp. Alg.* p. 272.

HAB. On the clayey sea-shore, near high-water mark. Appin, *Capt. Carmichael.* Near Queenstown, Cork Harbour, and various other places, *W. H. H.* Sidmouth, *Rev. R. Cresswell.*

GEOGR. DISTR. Channel coast of France, *M. Lenormand.*

DESCR. *Patches* spreading over the mud, covering spaces one to two or three or more inches in diameter, sometimes widely spreading, and commonly circular, bristling all over with rigid, erect, close-set but not confounded, tooth-like bundles of filaments, resembling the teeth of a *Hydnum. Filaments* composing the patch at first decumbent, spreading over the mud from a common centre, and interwoven together in a thin stratum, their points curved upwards, and strongly glued together in the tooth-like bundles;—each filament with a wide, yellowish, pellucid border, and a dark green endochrome, with subdistant, strongly-marked striæ. The filaments are what is called spuriously branched; that is, small filaments, resembling branches, adhere to the sides of longer ones, as shown in Fig. 4.

A well marked and easily recognized species, first noticed by the late Capt. Carmichael on the muddy sea-shore near Appin. He found it forming small patches an inch or two across, bristling over with small points like the teeth of a *Hydnum*, and this appears to be its usual habit when growing in mud. When found on rocks the patches are often of much greater extent, spreading over the surface for many feet, when the plant may be compared to pieces of rough, dark-green plush. There is always a peculiarly rigid, harsh feel by which this plant may be distinguished from *C. scopulorum*. From *C. pannosa* it differs in its shorter filaments, and the more tooth-like bundles into which they are aggregated.

Fig. 1. Patch of CALOTHRIX HYDNOIDES:—*the natural size.* 2. Tooth-like fascicles, from the same:—*slightly magnified.* 3 and 4. Filaments, and apices of the same:—*more highly magnified.*

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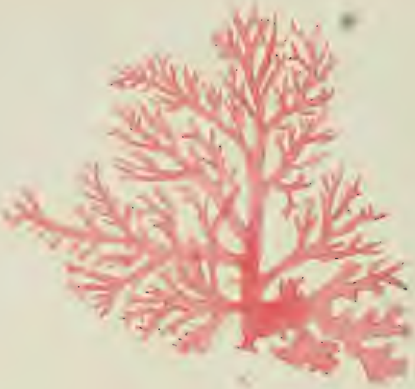

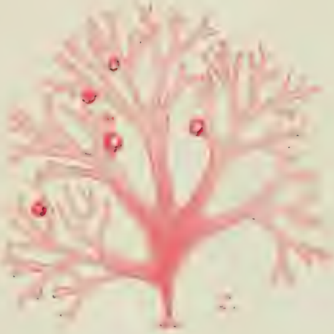

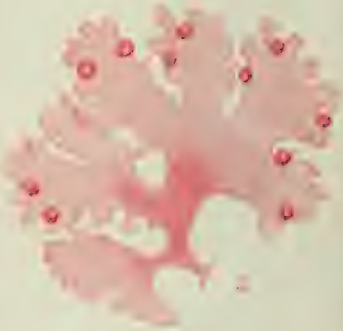

W. H. H. del et lith.

Plate CCCVII.

RHODYMENIA CRISTATA, *Grev.*

Gen. Char. *Frond* flat, membranaceous or subcoriaceous, ribless, veinless, cellular; central cells of moderate size, those of the surface minute. *Fructification*: 1, convex *tubercles* (*coccidia*), having a thick, cellular pericarp, and containing a mass of minute *spores*; 2, *tetraspores*, either zoned or tripartite, imbedded among the cells of the surface, scattered, or forming cloudy patches. Rhodymenia (*Grev.*),—from *ῥοδεος*, *red*, and *ὑμην*, a *membrane*.

Rhodymenia *cristata*; frond fan-shaped, membranaceous, subdichotomous, the segments dilated upwards, repeatedly subdivided; lesser divisions alternate, linear, laciniate at the ends and often fimbriate at the margin; tubercles spherical, marginal, sessile.

Rhodymenia cristata, *Grev. Alg. Brit.* p. 89. *Hook. Br. Fl.* vol. ii. p. 290. *Harv. Man.* ed. 2. p. 126. *Endl. 3rd. Suppl.* p. 210.

Callophyllis cristata, *Kütz. Sp. Alg.* p. 747.

Sphærococcus cristatus, *Ag. Syn.* p. 29. *Lyngb. Hyd. Dan.* p. 13. t. 4. *Ag. Sp. Alg.* vol. i. p. 300. *Ag. Syst.* p. 231. *Hook. Fl. Scot.* part 2. p. 104. *Grev. Crypt. Scot.* t. 85. *Fl. Edin.* p. 296. *Kütz. Phyc. Gen.* p. 410.

Fucus cristatus, *Herb. Linn. Turn. Hist.* t. 23.

Fucus gigartinus, *Fl. Dan.* t. 394. *Mohr, Hist. Isl.* p. 247. *Gunn. Fl. Norv.* n. 847.

Hab. Growing on the roots and stems of *Laminariæ* in deep water, very rare. Annual. July. Sea-shore at Wick, Caithness, *Messrs. Hooker and Borrer.* Frith of Forth, *Dr. Greville.* Berwick, *Dr. Johnston.* Shetland, at Bressay, in fourteen fathoms, *Prof. E. Forbes.* Several stations in the Orkney Islands, in 8–10 fathoms, *Lieut. Thomas and Dr. M'Bain.*

Geogr. Distr. Arctic Sea, and shores of the North of Europe. Iceland. Eastern shores of North America, as far south as Cape Cod.

Descr. *Root* minute, discoid. *Fronds* in British specimens from half an inch to an inch, rarely two inches long, in American from two to four or five inches, from one to three or four lines in breadth, fan-shaped or semicircular in outline, sometimes quite fastigiate, sometimes irregularly divided, some of the branches far out-topping the others, excessively branched from the base. *Branches* linear, or slightly broader upwards, subdichotomous, but very irregular in division; sometimes alternately divided, sometimes secund, and sometimes fingered, or branched in a manner compounded of all these. The lesser divisions are usually bordered with slender, jagged segments, often beautifully fringed; and the truncate tips finely cut. *Tubercles* abundant, as large as poppy-seed, scattered along the margin of the frond, both of the smaller and larger divisions. *Tetraspores* crowded in the ultimate ramuli, on plants more slenderly branched than those that bear tubercles. *Colour* a brilliant crimson-lake, becoming brighter in fresh water, and at length discharged on long steeping. *Substance* membranaceous, soft, adhering to paper in drying.

* * *

One of the rarest of the British Algæ, almost confined with us to the northern shores of Scotland, and the Orkney and Shetland Islands, and in no place found in abundance. In general British specimens are small, rarely attaining the size of that represented in our plate, which is copied from the largest of those presented to us by Messrs. Thomas and Mac Bain. Most others which we possess are less than an inch in length; some having deeply-cut fronds, like our Fig. 2, and others comparatively little divided, like Fig. 3. All are, however, but pygmies to the specimens collected on the east coast of America, where this plant is as common as *Plocamium coccineum* is with us, and to be found as invariably ornamenting the *sea-weed pictures* made by fair Bostonians as the latter is in those manufactured at this side the Atlantic. On the American coast *R. cristata* commences in the Arctic Sea, and extends southward to Cape Cod (lat. 42°) where it suddenly disappears, as do also several other northern species of marine plants and animals. In Boston Bay it is peculiarly plentiful and of large size, and sports in a number of varieties, some of which so closely resemble the narrower and more delicate specimens of *Sphærococcus coronopifolius*, that it requires a practised eye to distinguish them without an appeal to the dissecting knife.

The most southern point in Europe at which this plant has been found is Berwick Bay (lat. 55° 45′), and there I believe it has been taken but once. This affords a remarkable contrast to its southern limit in America.

Fig. 1. Rhodymenia cristata:—*natural size.* 2. A small frond, *somewhat magnified.* 3. Another, of a broader variety. 4. Apices of laciniæ with imbedded tetraspores. 5. Tetraspores. 6. Section of a coccidium. 7. Spores. 8. Thin slice, to show internal structure of the frond:—*all magnified.*

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Plate LXXV

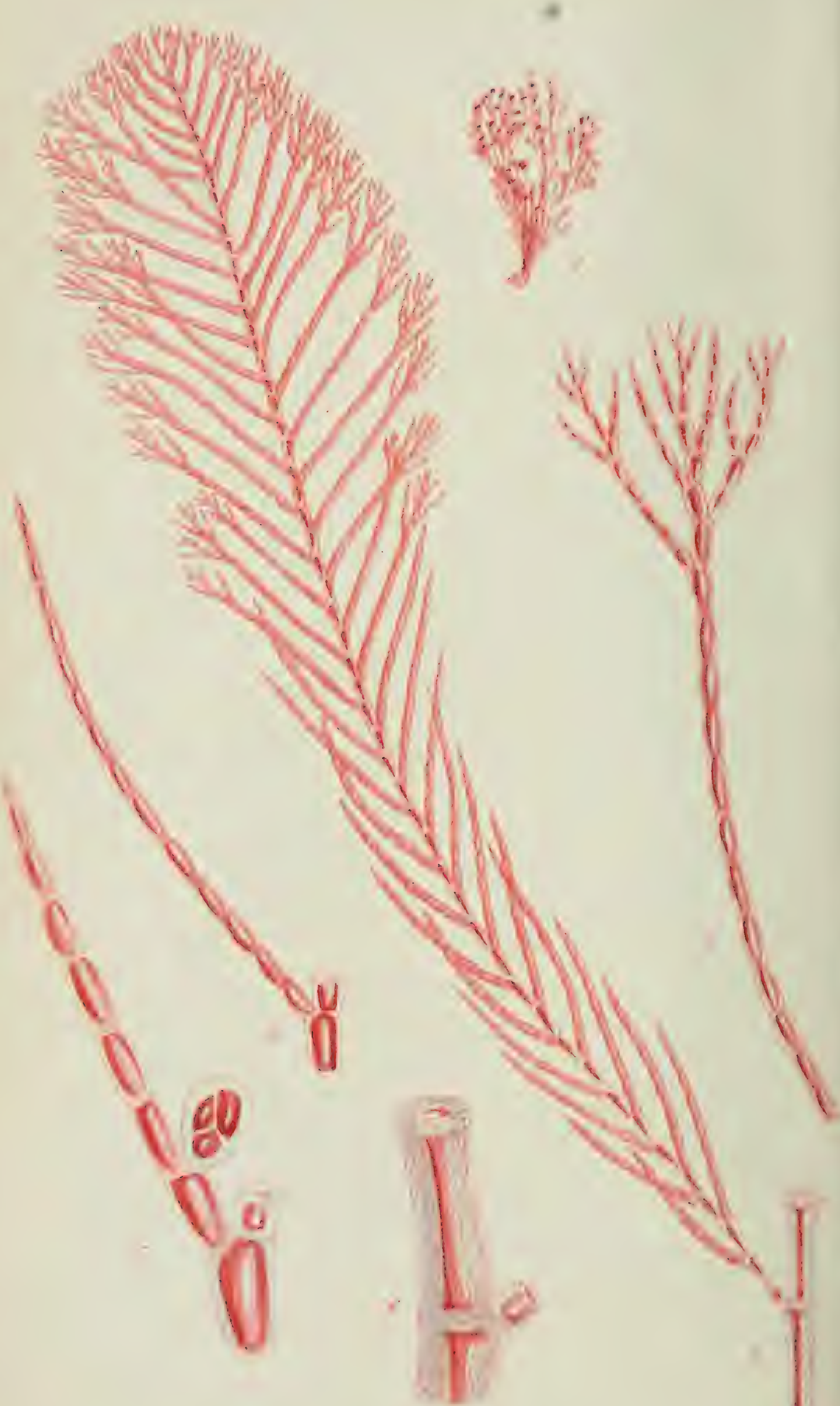

PLATE CCCVIII.

CALLITHAMNION FASCICULATUM, *Harv.*

GEN. CHAR. *Frond* rosy or brownish-red, filamentous; stem either opake and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds on distinct plants: 1, external *tetraspores,* scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like *receptacles (favellæ),* seated on the main branches, and containing numerous, angular spores. CALLITHAMNION (*Ag.*),—from καλλος, *beauty,* and θαμνιον, *a little shrub.*

CALLITHAMNION *fasciculatum;* tufted; branches erect, flexuous, level-topped; plumules elongate, erect, linear-obovate, truncate; pinnæ long and flexuous, the lowermost simple, appressed, the upper erecto-patent, branching toward the tip; articulations of the branches veiny, thrice as long as broad, of the pinnæ once or twice as long as broad, with contracted dissepiments.

CALLITHAMNION fasciculatum, *Harv. in Hook. Br. Fl.* vol. ii. p. 343. *Harv. Man.* ed. 2. p. 179. *Kütz. Sp. Alg.* p. 652.

HAB. At Yarmouth, *Mr. Borrer,* in Herb. Hooker.

GEOGR. DISTR. —— ?

DESCR. *Frond* from two to three inches high, nearly bare of branches below, much branched and tufted upwards, bushy, capillary; the apices of the branches looking, to the naked eye, as if truncated or corymbose. *Branches* long and flexuous, very erect, their upper half closely plumulate. *Plumules* long and narrow, with a linear-obovate or spathulate outline, erect, the lowermost pinnæ quite simple, moniliform, with contracted joints and acute terminal cells; the uppermost gradually longer and more spreading, branching at the apex. *Articulations* of the branches veiny, from three to four times as long as broad; of the lesser branches (or rachides of the plumules) about twice as long as broad; of the pinnules oval, twice as long as broad, with very contracted dissepiments. *Tetraspores* elliptical, mostly solitary, toward the base of a pinnule. *Colour* a fine purple-red. *Substance* membranaceous, adhering to paper.

I have deferred figuring *Cal. fasciculatum* of the Brit. Flora to this late period, in the hope, disappointed hitherto, that some fortunate collector would find it again, and thus establish a species which at present rests upon a single specimen preserved in the herbarium of Sir W. J. Hooker, and collected early in the present century. The figure now given exhibits all the characters of the species, faithfully copied from a small fragment of the Hookerian specimen. It will be seen that the habit, to the naked eye, is that of *C. corymbosum*, while the microscopic characters are nearer those of *C. Borreri*, than those of any other species. On comparing our present figure with our Tab. CLIX. differences so important will be seen between the two plants as to forbid their being confounded together, and thus we are compelled to retain *C. fasciculatum*, although it rests on such unsatisfactory evidence as a solitary specimen. The diameter of the filament is greater than that of the usual state of *C. Borreri*, and much greater than that of *C. roseum*, and the constricted dissepiments of the ramuli are very characteristic. It will be seen by Fig. 6, that the stems are those of a "*Phlebothamnion*," Kützing.

Fig. 1. Callithamnion fasciculatum :—*the natural size.* 2. A plumule or pinnated branchlet from the same. 3. One of the lowermost pinnæ. 4. One of the upper pinnæ. 5. Pinnæ with a tetraspore. 6. Small portion of one of the main branches :—*all more or less magnified.*

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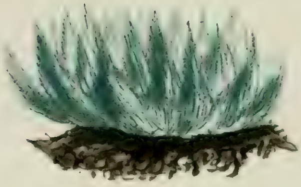
Plate CCCIX.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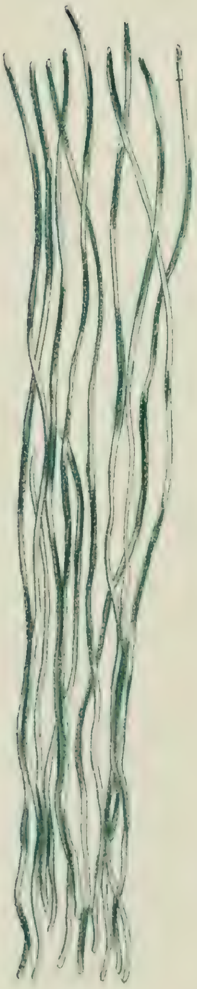
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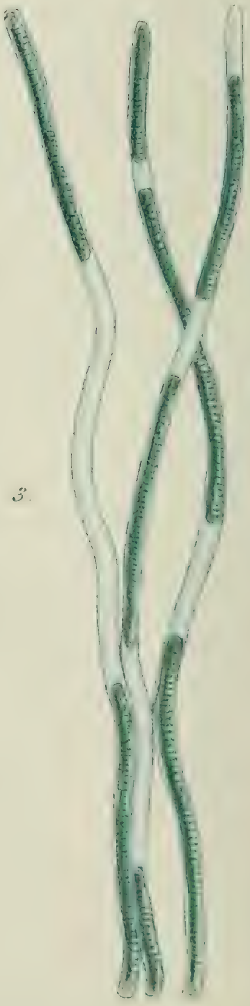
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W. H. H. del et lith.

F. Reeve imp.

PLATE CCCIX.

CALOTHRIX SEMIPLENA, *Ag.*

GEN. CHAR. *Filaments* destitute of a mucous layer, erect, tufted or aggregated, fixed at the base, somewhat rigid, not oscillating. *Tube* continuous; endochrome green, densely annulated, at length dissolved into lenticular sporidia. CALOTHRIX (*Ag.*),—from καλος, *beautiful,* and θριξ, *a hair.*

CALOTHRIX *semiplena*; filaments long, slender, tough, flexuous, densely interwoven into lamellated tufts; endochrome glaucous green, frequently interrupted, leaving parts of the tube empty.

CALOTHRIX semiplena, *Ag. Bot. Zeit.* 1827, No. 40.

CALOTHRIX lamellata, *Harv. in Herb.* 1844! (*excl. spec. from Roundstone*).

LYNGBYA semiplena, *J. Ag. Alg. Medit.* p. 11.

LYNGBYA lutescens, *Lieb.* (*fide Kütz.*)

LEIBLEINIA semiplena, *Kütz. Phyc. Gen.* p. 221. *Sp. Alg.* p. 278.

HAB. In rock-pools near high-water mark, growing on *Corallina officinalis* and other small algæ. Kilkee, *W. H. H.* Sidmouth, *Rev. R. Cresswell.*

GEOGR. DISTR. The Mediterranean and Adriatic Seas, *Agardh.* Shores of Norway, *Areschoug*! (Alg. Scand. No. 8! growing with *Callithamnion Rothii*). Cherbourg, *Lenormand* (as *C. pulvinata*? Ag.)

DESCR. *Filaments* from half an inch to an inch or more in length, very slender, simple, waved and gently curved, but not curling, cohering firmly together in flattened bundles or tufts, which often expand laterally into laminæ, which are broad below, and gradually narrowed upwards, standing erect, and frequently pointed. These laminæ are sometimes loosely bundled together; at other times they are closely heaped, one on the other. The *endochrome* is dense, of a glaucous or verdegris green colour, and is frequently interrupted, leaving long spaces of colourless tube between each frustum of endochrome. The apices of the filaments are blunt. *Substance* membranaceous, but tough, adhering to paper in drying.

I have to apologize to the readers of the 'Phycologia' for having, under Pl. LXXVI. (*Calothrix pannosa*), confounded the plant now figured with a very different species. The confusion is, however, fortunately limited to the remarks under the description, and to the habitats given;—for the figure, and the whole description, belong to *C. pannosa,* or at least to the Roundstone plant so named. I am indebted to my friend Mr. Thwaites, for suggesting that our plant (*C. lamellata*, MS.) might be the *C. semiplena* of Agardh, and, though I have seen no authentic specimen, I have little doubt that this is so. At least, the specimen in my copy of Areschoug's 'Algæ Scandinavicæ,' which is quoted by Kützing under his *Leibleinia semiplena,* seems identical with our Irish specimens here figured, but is less luxuriant. The species would appear to have a wide range, both in the warmer and colder seas of Europe. Specimens from Cherbourg, communicated by *M. Lenormand,* doubtfully marked *C. pulvinata*? Ag., are very similar to those from the opposite shores of England.

Fig. 1. CALOTHRIX SEMIPLENA, a mass of laminated tufts:—*the natural size.* 2. Filaments from the same:—*magnified.* 3. Portions of filaments:—*more highly magnified.*

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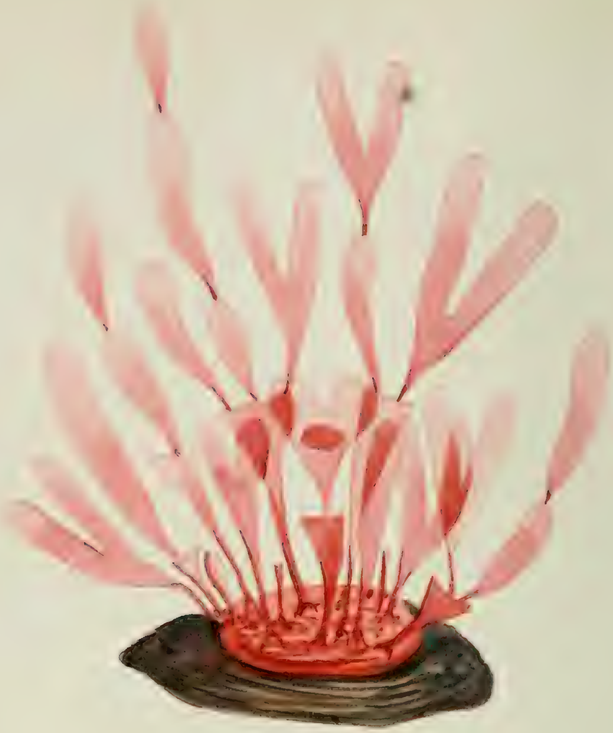

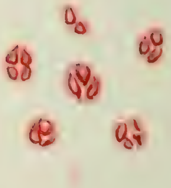

W.H.H. del. et

F. Reeve, imp.

PLATE CCCX.

PHYLLOPHORA PALMETTOIDES, *J. Ag.*

GEN. CHAR. *Frond* stipitate, rigid, membranaceous, proliferous, nerveless, or with a vanishing nerve, cellular; cells minute, angular, gradually smaller towards the surface. *Fructification,* 1, *tubercles* (*favellidia* ?) scattered over the frond containing masses of minute spores; 2, *warts* (*nemathecia*) seated on the frond, composed of radiating, moniliform filaments, whose lower articulations are at length changed into spores; 3, *tetraspores,* collected into sori, either towards the apex of the frond or in proper leaflets. PHYLLOPHORA (*Grev.*),—from φυλλον, a *leaf,* and φορεω, to *bear.*

PHYLLOPHORA *Palmettoides*; root a widely-expanded disc; stem cylindrical, filiform, simple or branched, expanding into an oblong, narrow-obovate or cuneate, simple or once-forked, rose-coloured frond, which is sometimes proliferous; sorus of tetraspores solitary, transverse, elliptical, near the apex of the frond, immersed in its substance.

PHYLLOPHORA Palmettoides, *J. Ag. in litt. Harv. Man.* ed. 2. p. 144.

PHYLLOPHORA Brodiæi, β. simplex, *Harv. Phyc. Br.* t. xx. f. 2, 3, 4.

CHONDRUS Brodiæi, β. simplex, *Grev. Alg. Brit.* p. 133. *Hook. Br. Fl.* vol. ii. p. 303. *Harv. Man.* ed. 1. p. 78. *Wyatt, Alg. Danm.* no. 121.

FUCUS membranifolius, *var.* roseus, *Turn. Hist.* t. 72. f. *m.*

HAB. On rocks near low-water mark. Perennial. Winter and spring. Rare. Sidmouth and Torquay, *Mrs. Griffiths* and *Miss Cutler.* Plymouth and Whitsand Bay, *Rev. W. S. Hore.*

GEOGR. DISTR. South coast of England. Mediterranean Sea.

DESCR. *Root* a widely-spreading, fleshy disc, an inch or more in diameter. *Fronds* numerous from the same disc, growing in a scattered manner, two to three or four inches in length, rising with a filiform stem to the height of an inch or an inch and a half; stem then compressed and ending in a cuneate or narrow-obovate, obtuse, simple or forked lamina; sometimes the frond is deeply forked, sometimes only emarginate; the segments frequently proliferous from the apex, or contracted in the middle, and again enlarged. When the tips are injured, the torn edge often bears numerous leaflets irregularly. *Tubercles* I have not seen. *Tetraspores* forming dense, immersed, transverse, oval sori in the centre of the lamina, very minute. *Colour* a bright rosy red. *Substance* membranous, but rather rigid, not adhering to paper, except after long soaking.

An imperfect representation of this plant has already been given in our first volume (Tab. XX. Fig. 2, 3, 4,) where it was regarded as a variety of *Phyllophora Brodiæi,* according to the views of most British botanists. In the last edition of the 'Manual' I have recognized its specific existence under the name here given, a name adopted from Prof. J. Agardh, who, in a recent letter, points out particularly the characters which distinguish this little plant from the original *P. Brodiæi.* These characters are,—the position of the sorus of tetraspores; the brighter colour of the frond; and the much more widely expanded root. To these I would add a marked difference in its geographical distribution; for while *P. Brodiæi* is confined to our northern shores, *P. palmettoides* is a native, in this country, only of the south of England, and, on the continent, is found in the Mediterranean.

Fig. 1. Fronds of PHYLLOPHORA PALMETTOIDES:—*the natural size.* 2. Frondlet with a *sorus* in the centre:—*slightly enlarged.* 3. Tetraspores, from the same. 4. Thin slice of the frond, to show structure:—*both highly magnified.*

[illegible]

Plate CCV

PLATE CCCXI.

LYNGBYA FERRUGINEA, *Ag.*

GEN. CHAR. *Filaments* destitute of a mucous layer, free, flexible, elongated, decumbent, not oscillating. *Tube* continuous; endochrome green or purple, densely annulated, and finally separating into lenticular sporidia. LYNGBYA (*Ag.*),—in honour of *Hans Christian Lyngbye*, author of an excellent work on the Algæ of Denmark.

LYNGBYA *ferruginea*; filaments slender, flaccid, forming a long stratum of a verdigris-green colour, which gradually changes to a pale chestnut.

LYNGBYA ferruginea, *Ag. Syst. Alg.* p. 73. *Harv. in Hook. Brit. Fl.* vol. ii. p. 226. *Harv. Man.* ed. 2. p. 226.

LYNGBYA æruginosa, *Ag. Syst.* p. 74. *Kg. Sp. Alg.* p. 282.

LYNGBYA subsalsa, *Carm. MSS.*

SCYTONEMA effusum, *Carm. MS.* (*ante*).

HAB. In small, mud-bottomed pools of brackish water, by the sea-side, filled at spring tides. Appin, *Capt. Carmichael.*

GEOGR. DISTR. Similar situations in the North of Europe.

DESCR. Stratum "exceedingly thin and lax, extensive, at first of a vivid green colour, but passing gradually into a pale chestnut." *Carm.* *Filaments* an inch long, flaccid, bent in various curves, but not twisted, of a pale verdigris-colour under the microscope. *Endochrome* filling the tube, evidently striate, the striæ rather distant; border narrow. Colour of the mass when dry a dull verdigris-green without gloss.

No one appears to have noticed this plant but the late Captain Carmichael, a fact to be regarded more as a proof of the comparatively little attention which has yet been paid to the *Oscillatorieæ*, than evidence of the rarity of this particular species. How few of the collectors of seaweeds trouble themselves with the obscure vegetation of salt-water mud-bottomed pools near the shore:—yet such situations, when attentively examined, are found to be rich in microscopic forms, and in species of this curious family. I have no doubt but that the present species, which appears to be not uncommon in Northern Europe, may yet be found in many other habitats than the one recorded above.

Fig. 1. Lyngbya ferruginea; a portion of the stratum, as it appears to the naked eye. 2. Filaments from the same:—*magnified.* 3. Portion of a filament, *highly magnified.*

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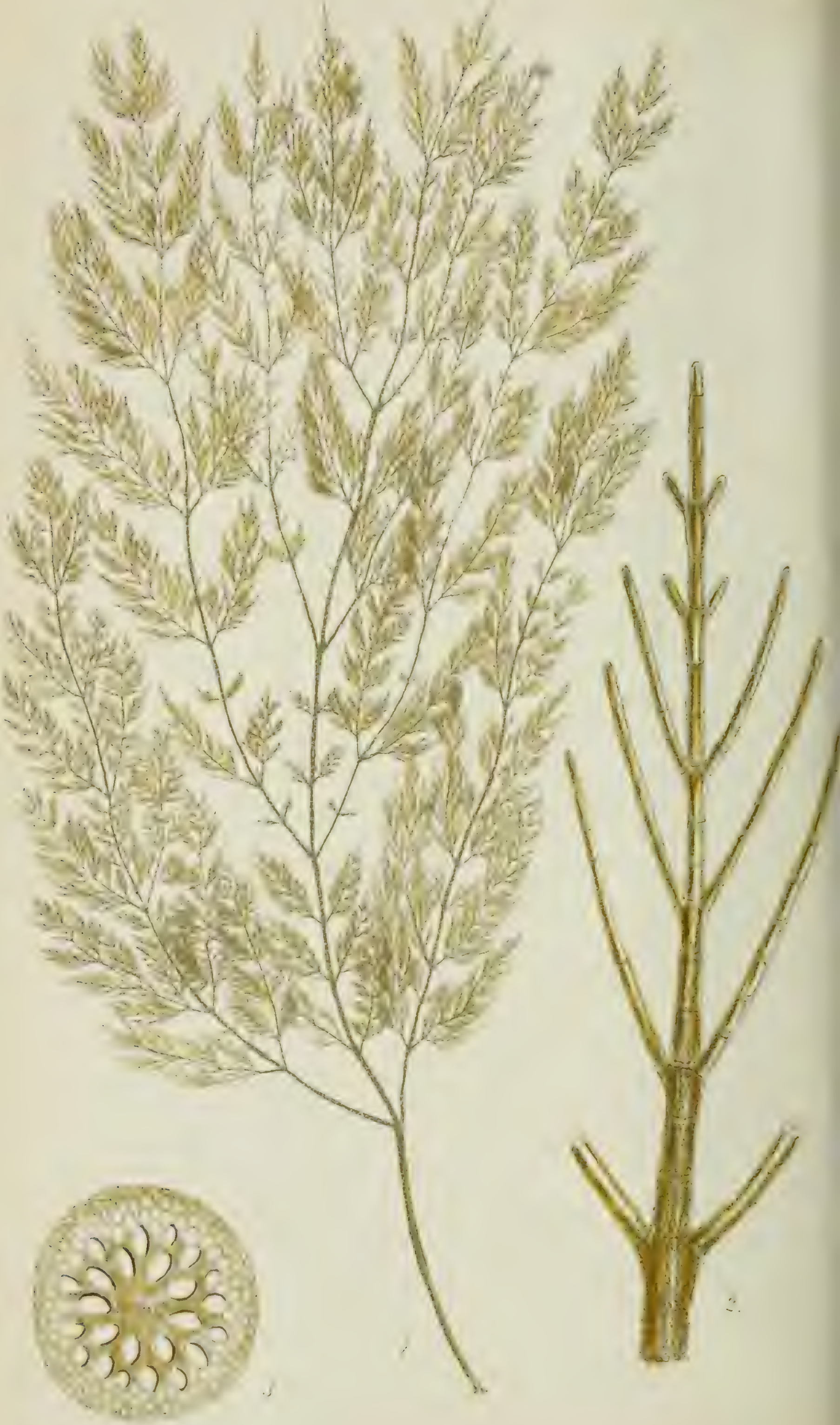
Plate CCCXII



W. H. H. del et lith.

F. Reeve,

Plate CCCXII.

DESMARESTIA VIRIDIS, *Lamour.*

Gen. Char. *Frond* linear, either filiform, compressed, or flat, distichously branched, cellular, traversed by an internal, single-tubed, articulated filament; producing, when young, marginal tufts of byssoid, branching fibres. Desmarestia (*Lamour.*),—in honour of *A. G. Desmarest,* a celebrated French naturalist.

Desmarestia *viridis*; frond cylindrical, filiform, repeatedly pinnate; pinnæ and pinnulæ capillary, exactly opposite, patent.

Desmarestia viridis, *Lamour. Ess.* p. 25. *Endl. 3rd Suppl.* p. 28. *Harv. Man.* ed. 2. p. 24. *Kütz. Phyc. Gen.* p. 344. *Kütz. Sp. Ag.* p. 570.

Dichloria viridis, *Grev. Alg. Brit.* p. 39. t. 6. *Hook. Br. Fl.* vol. ii. p. 274. *Harv. in Mack. Fl. Hib.* part 3. p. 173. *Wyatt, Alg. Danm.* No. 56. *J. Ag. Sp. Alg.* vol. i. p. 164.

Sporochnus viridis, *Ag. Sp. Alg.* vol. i. p. 154. *Ag. Syst.* p. 259. *Grev. Fl. Edin.* p. 287.

Chordaria viridis, *Ag. Syn.* p. 14. *Hook. Fl. Scot.* part 2. p. 98.

Gigartina viridis, *Lyngb. Hyd. Dan.* p. 44.

Fucus viridis, *Fl. Dan.* t. 886. *Esper, Ic. Fuc.* t. 114. *Stack. Ner. Brit.* t. 17. *Turn. Syn.* vol. ii. p. 397. *Turn. Hist.* t. 97. *E. Bot.* t. 1669.

Hab. In the sea, growing on stones and the larger algæ between tide-marks, and below low-water mark. Annual. Spring and early summer. Not uncommon.

Geogr. Distr. Atlantic shores of Europe and America. Northern Pacific, and Southern and Antarctic Oceans.

Descr. *Root* a scutate disc. *Fronds* from two to three feet in length, filiform, from a quarter to half a line in diameter at the base, gradually attenuated upwards to an extreme fineness, excessively branched, having an ovate outline, the lower branches long, the upper gradually shorter. All the branches, and every one of the lesser divisions, down to the most minute ramulus, are exactly opposite and distichous; the larger divisions patent or nearly horizontal, the lesser gradually more erect. In a young state the branches and ramuli terminate in excessively fine, articulated, confervoid filaments, which gradually become coated with cells, and thus opake; the confervoid filament being then encased, and changed into the axis of the compound frond. *Structure* densely cellular, with large air-cells dispersed through the cellular substance; the axile filament very slender. *Colour*, when growing, a deep brown-olive, or "foxy," quickly becoming verdegris-green when removed from the water. *Substance* soft and flaccid, soon decomposing.

There is no British alga with which this beautiful plant can well be confounded. The extreme delicacy of its capillary ramuli, the constantly exact opposition of all its parts, from the primary branches to the most minute of the decompound ramuli (the last of which are much finer than the most slender hair), and the versatile colour, are all marks which peculiarly belong to *Desmarestia viridis.* Old and weather-beaten fronds, which have lost the more delicate ramuli, have something the aspect of *Dictyosiphon fœniculaceus,* but may at once be distinguished by the opposite branching.

At Fig. 2 I have represented the magnified appearance of one of the growing points of the young frond, showing the gradual coating of the confervoid frame-work (or *skeleton*) of the frond. It will be seen that all the younger portions consist of a simple string of cells, or *articulated filament,* and that in the lower part these cells are coated by a stratum of much smaller cellules. As the growth proceeds these external coats are constantly increased, while the original central *skeleton* may still be traced, through all the branches, and even in the stem, a section of which is seen at Fig. 3.

D. viridis is very widely dispersed through the colder zones, both north and south, and increases in luxuriance as it approaches either pole.

Fig. 1. DESMARESTIA VIRIDIS :—*the natural size.* 2. A growing apex of a young branch :—*highly magnified.* 3. A transverse section of the stem :—*magnified.*

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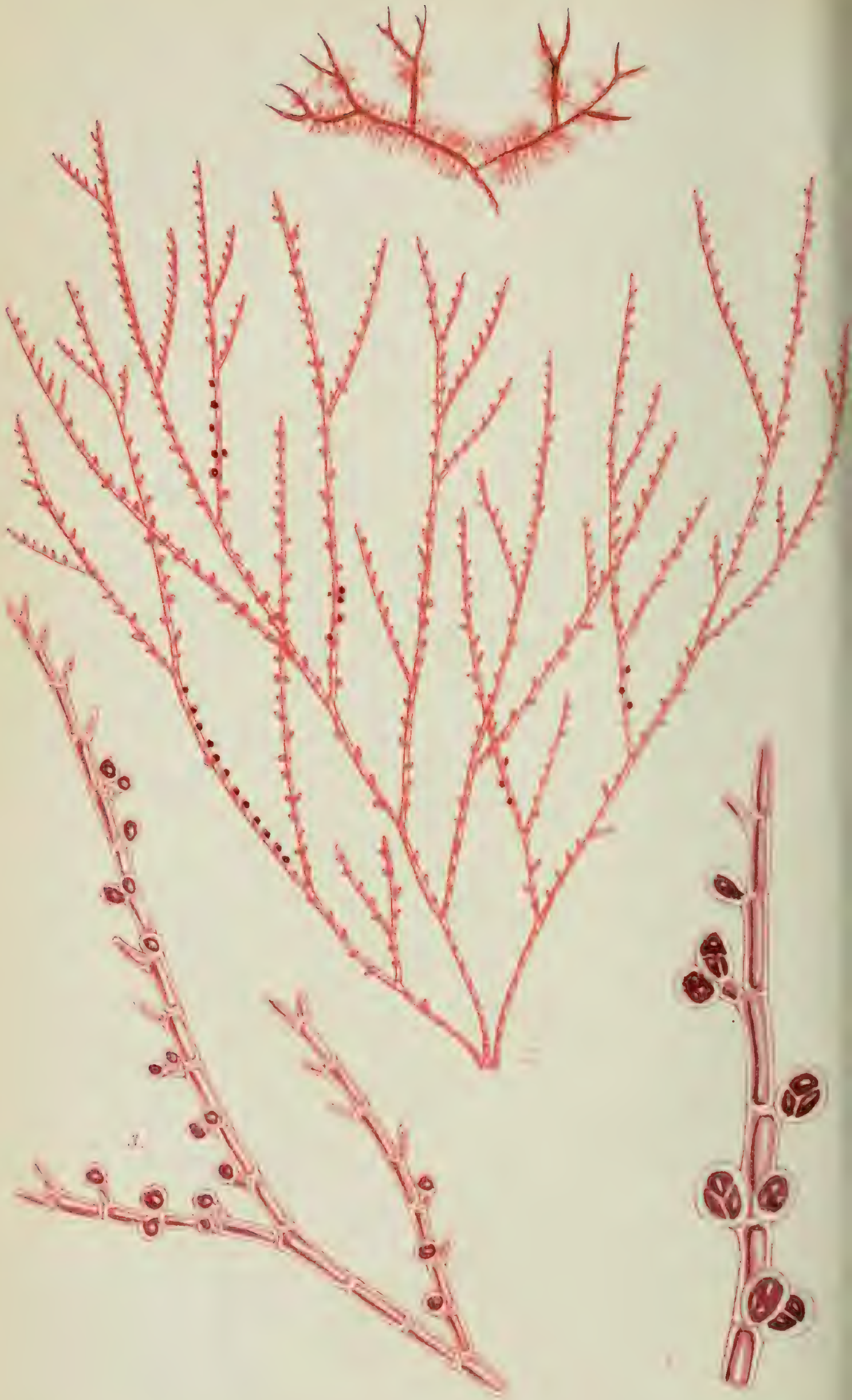
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PLATE CCCXIII.

CALLITHAMNION VIRGATULUM, *Harv.*

GEN. CHAR. *Frond* rosy or brownish-red, filamentous; stem either opake and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds, on distinct plants: 1, external *tetraspores* scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like receptacles (*favellæ*) seated on the main branches, and containing numerous angular spores. CALLITHAMNION (*Lyngb.*),—from καλλος, *beauty*, and θαμνιον, *a little shrub.*

CALLITHAMNION *virgatulum*; rose-red, minute, tufted, much branched; branches long and straight, erecto-patent, alternate or secund; ramuli from every joint, short, obtuse, mostly secund; articulations thrice as long as broad; tetraspores scattered along the branches.

CALLITHAMNION virgatulum, *Harv. in Hook. Br. Fl.* vol. ii. p. 349. *Wyatt, Alg. Danm.* No. 189.

CALLITHAMNION Daviesii, *var.*, *Harv. Man.* ed. 1. p. 117, ed. 2. p. 184.

HAB. Parasitical on *Ceramium rubrum,* in pools between tide-marks. Torquay, *Mrs. Griffiths.*

GEOGR. DISTR. —— ?

DESCR. *Filaments* from two to four lines high, erect, forming little pencil-like tufts, or clothing the stems of the *Ceramium* continuously, in patches 1-2 inches in line, much branched. *Branches* erect, or erecto-patent, long, straight or gently curved, rod-like, with a few scattered similar secondary branches, which are either alternate or secund. *Ramuli* springing from nearly every joint of the primary and secondary branches, mostly secund, sometimes two together, very short, usually consisting of a single cell, obtuse. *Tetraspores* (formed from altered ramuli) scattered plentifully along the branches, secund or two together, either sessile or raised on little stalks. *Colour* a fine, clear, rosy red, preserved in drying. *Substance* membranaceous, delicate. The plant adheres closely to paper.

If we confine our attention to specimens that strictly answer to the characters illustrated in this and the following plate, *C. virgatulum* and *C. Daviesii* appear to be very distinct one from the other, and easily recognized at a glance:—the former distinguished by the uniform production of short ramuli along all its branches, which thus have the appearance, under the microscope, of budding rods; the latter known by having a few longish ramuli crowded towards the axils of the branches, while the rest of the branch is bare. But I am sorry to say that in practice I find it by no means easy to distinguish these supposed species. It is true that there is no lack of specimens, which are thus clearly distinguishable; but then, on the other hand, there is no lack of intermediate forms, such as bear the names *C. secundatum* and *C. lanuginosum*; *C. luxurians*, J. Ag.; *C. mirabile*, Kütz.; *C. minutissimum*, Suhr.; *C. Lenormandi*, Suhr.; and probably others enumerated by Kützing. So that once we admit *two* species among these parasites, the door is opened to a dozen. It was for this reason that in the last edition of the Manual I proposed to reduce the four British forms described in 'British Flora' to one, retaining for it the name *Daviesii*. To this decision I have received some earnest protests, particularly from Mrs. Griffiths, and in deference to this "pressure from without" I so far deviate from the line I had prescribed to myself, as to figure the typical *C. virgatulum*; at the same time that I retain my opinion respecting its close affinity—if no more—to *C. Daviesii*.

Fig. 1. Portion of a frond of *Ceramium rubrum* infested with CALLITHAMNION VIRGATULUM:—*the natural size*. 2. Fronds of *Cal. virgatulum*:—*magnified*. 3. Part of a fertile branch. 4. Apex of the same, with tetraspores:—*more or less highly magnified*.

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Tab. CCCXIV.

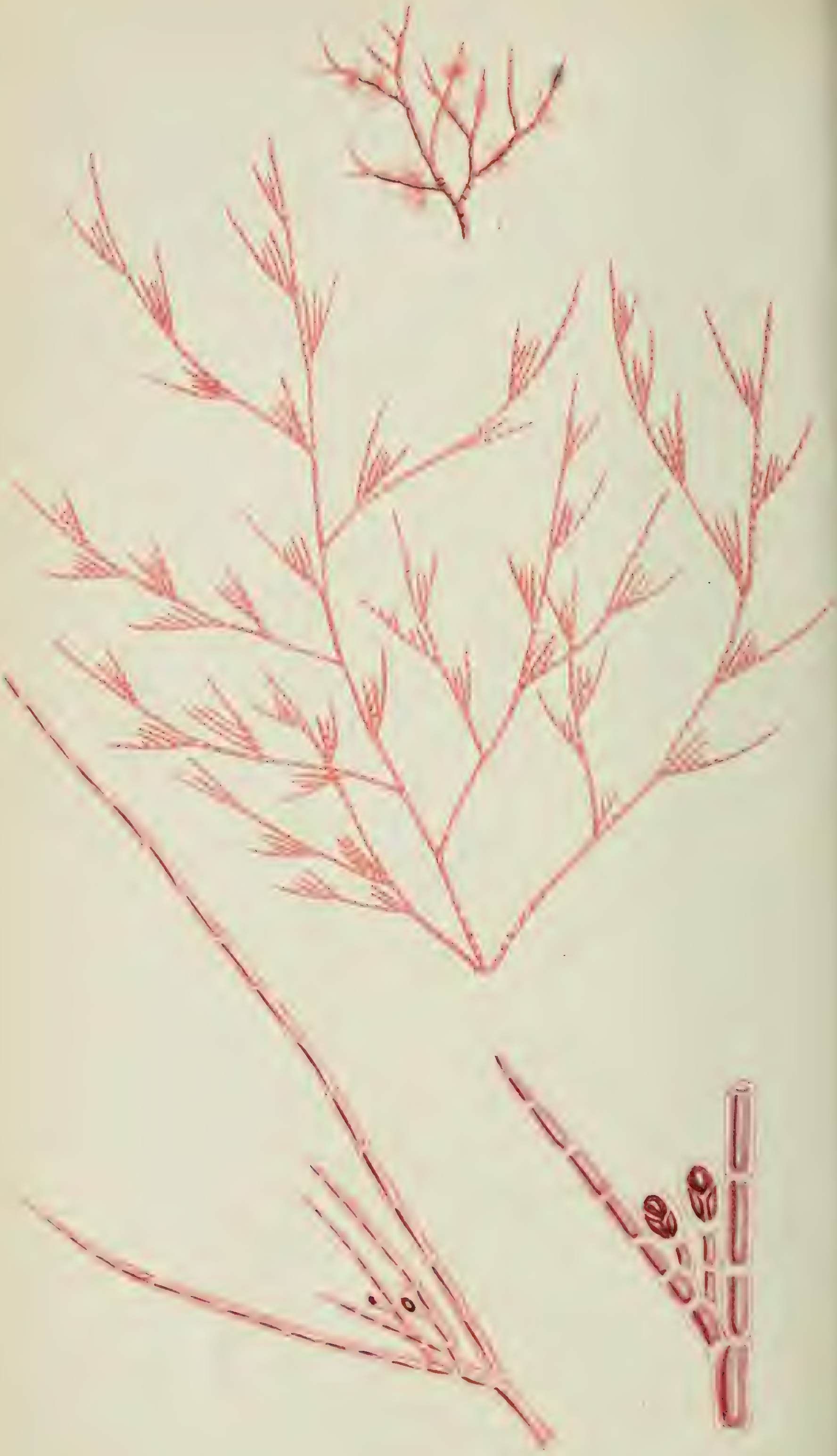

PLATE CCCXIV.

CALLITHAMNION DAVIESII, *Lyngb.*

GEN. CHAR. *Frond* rosy or brownish-red, filamentous; stem either opake and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds, on distinct plants: 1, external *tetraspores*, scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like receptacles (*favellæ*) seated on the main branches, and containing numerous angular *spores*. CALLITHAMNION (*Lyngb.*),—from καλλος, *beauty*, and θαμνιον, *a little shrub.*

CALLITHAMNION *Daviesii*; rose-red, minute, tufted, much branched; branches curved, scattered, patent; ramuli of several cells, fascicled, or crowded toward the axils of the secondary branches; tetraspores pedicellate, borne on the axillary ramuli.

CALLITHAMNION Daviesii, *Lyngb. Hyd. Dan.* p. 129. t. 41. *Ag. Sp. Alg.* vol. ii. p. 186. *Harv. in Hook. Brit. Fl.* vol. ii. p. 348. *Harv. Man.* ed. 1. p. 117. ed. 2. p. 184. (*in part*). *Kütz. Spec. Alg.* p. 638. (*in part*).

TRENTEPOHLIA Daviesii, *Harv. in Mack. Fl. Hib.* part 3. p. 219.

CONFERVA Daviesii, *Dillw. Conf.* t. F. *E. Bot.* t. 2329.

HAB. Parasitical on *Ceramium rubrum* and other small Algæ, in pools between tide-marks. Annual. Summer and Autumn. Anglesea, *Rev. H. Davies.* Bantry, *Miss Hutchins.* Torquay, *Mrs. Griffiths.* Brighton, *Mr. Borrer*; and perhaps generally distributed round our shores.

GEOGR. DISTR. Atlantic Shores of Europe. North America.

DESCR. *Filaments* two to four lines high, forming small, pencil-like tufts, or spreading continuously, sometimes but slightly divided, sometimes much branched, the branches in one or two series, curved, spreading. *Primary* branches elongated, destitute of ramuli, but bearing usually, at considerable intervals, two or more rather short, *secondary* branches, which are either alternate or secund, and are furnished near their base, almost at the axil, with several secund closely-placed ramuli. *Ramuli* of several cells, either simple or slightly branched, rarely scattered. *Tetraspores* pedicellate, borne on the supra-axillary ramuli, elliptical. *Colour* a fine rosy red. *Substance* membranaceous and delicate. In drying, the plant adheres closely to paper.

Under the last plate I have stated the close affinity which connects this species with the *Cal. virgatulum*, there figured. Both are beautiful microscopic objects, but particularly *C. virgatulum*, for I find *C. Daviesii* very generally infested by parasites still more minute than itself, and particularly in and about the axillary ramuli. I do not find it so generally fertile as *C. virgatulum*; the crowding of parasites, and collection of dirt about the ramuli where the tetraspores are borne, probably destroying the fructification.

This little plant bears the name of the late Rev. Hugh Davies, an able botanist of the last generation, whose name will be familiar to the readers of 'English Botany.' He discovered it early in the present century, on the Welsh coast, and it has been found (under one or other of its varieties) in most parts of our shores, on those of Europe, and in America.

Fig. 1. Part of a frond of *Ceramium rubrum*, infested with CALLITHAMNION DAVIESII. 3. Fronds of *Callithamnion Daviesii*:—*magnified*. 3. Portion of a branch. 4. Axillary ramuli and tetraspores from the same:—*more or less highly magnified*.

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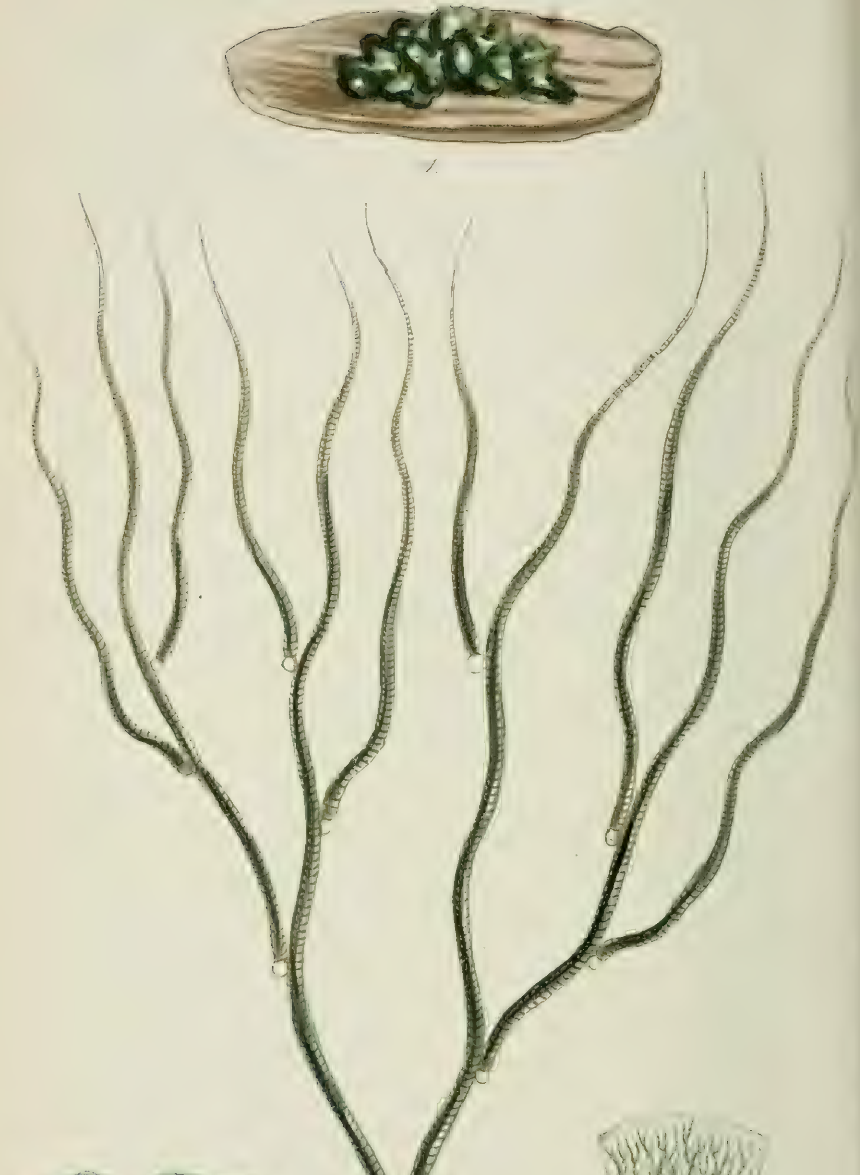

[illegible]

F. Reeve, imp.

PLATE CCCXV.

RIVULARIA PLICATA, *Carm.*

GEN. CHAR. *Frond* globose or lobed, fleshy, firm, composed of continuous, radiating filaments, annulated within and springing from a spherical globule, and surrounded by, or set in, gelatine. RIVULARIA (*Roth*), —in allusion to the fluviatile habitat of some of the species.

RIVULARIA *plicata*; fronds rather large, densely gregarious, gelatinous, compresso-plicate, often hollow and at length ruptured, dark green; filaments wavy, associated in dichotomous series, tapering to a fine point.

RIVULARIA plicata, *Carm. Harv. in Hook. Br. Fl.* vol. ii. p. 392. *Harv. Man.* ed. 2. p. 222.

LICHEN corrugatus, *Dickson! (fide Borrer).*

HAB. On the rocky sea-shore, about high-water mark, or in situations only occasionally overflowed by salt water. Appin, *Capt. Carmichael.* Ballintrae, Ayrshire, *Mr. W. Thompson.* Eyrmouth, *Dr. Johnstone.* Torbay, *Mrs. Griffiths.* Innischerig Island, Malbay; and elsewhere, *W.H.H.*

GEOGR. DISTR. —— ?

DESCR. *Fronds* densely crowded together, each patch generally occupying a surface of several square inches; variously lobed, and by mutual pressure distorted and compressed, so that the mass has a plaited or warted appearance. When young the fronds are solid and firmly gelatinous; as they advance in age they become hollow, and are at length often ruptured and variously torn. *Filaments* wavy and much attenuated, associated in dichotomous or subdichotomous series, each filament being joined to its fellow by a spherical, pellucid connecting cell, and the whole firmly set in the gelatinous matrix of the frond. *Rings* evident and close. *Colour* a dark, lurid, or blackish green. *Substance* elastic, smooth, and somewhat lubricous. In drying, the plant shrinks considerably, and if subjected to pressure will adhere firmly to paper.

* * *

A well-marked species of *Rivularia*, easily recognized and not uncommon on several parts of our shores. It was first noticed by the late Captain Carmichael on the west coast of Scotland. Like *R. nitida*, it becomes hollow in age, but may always be known from that species by its much darker and duller colour, smaller size, and the difference of habitat. The fronds are very irregular in shape, and alter considerably as they advance to maturity, by the lateral pressure of one frond on another. I cannot say anything to the collector of specimens in praise of the beauty of this production; what it has in that way it keeps concealed, or reserves for microscopic eyes.

Fig. 1. Cluster of fronds of RIVULARIA PLICATA, on a piece of rock:—*the natural size.* 2. One of the fronds, cut vertically to show the hollow centre. 3. A vertical portion of the gelatine, with imbedded filaments. 4. Some of the filaments removed and pressed asunder:—*the latter figures more or less highly magnified.*

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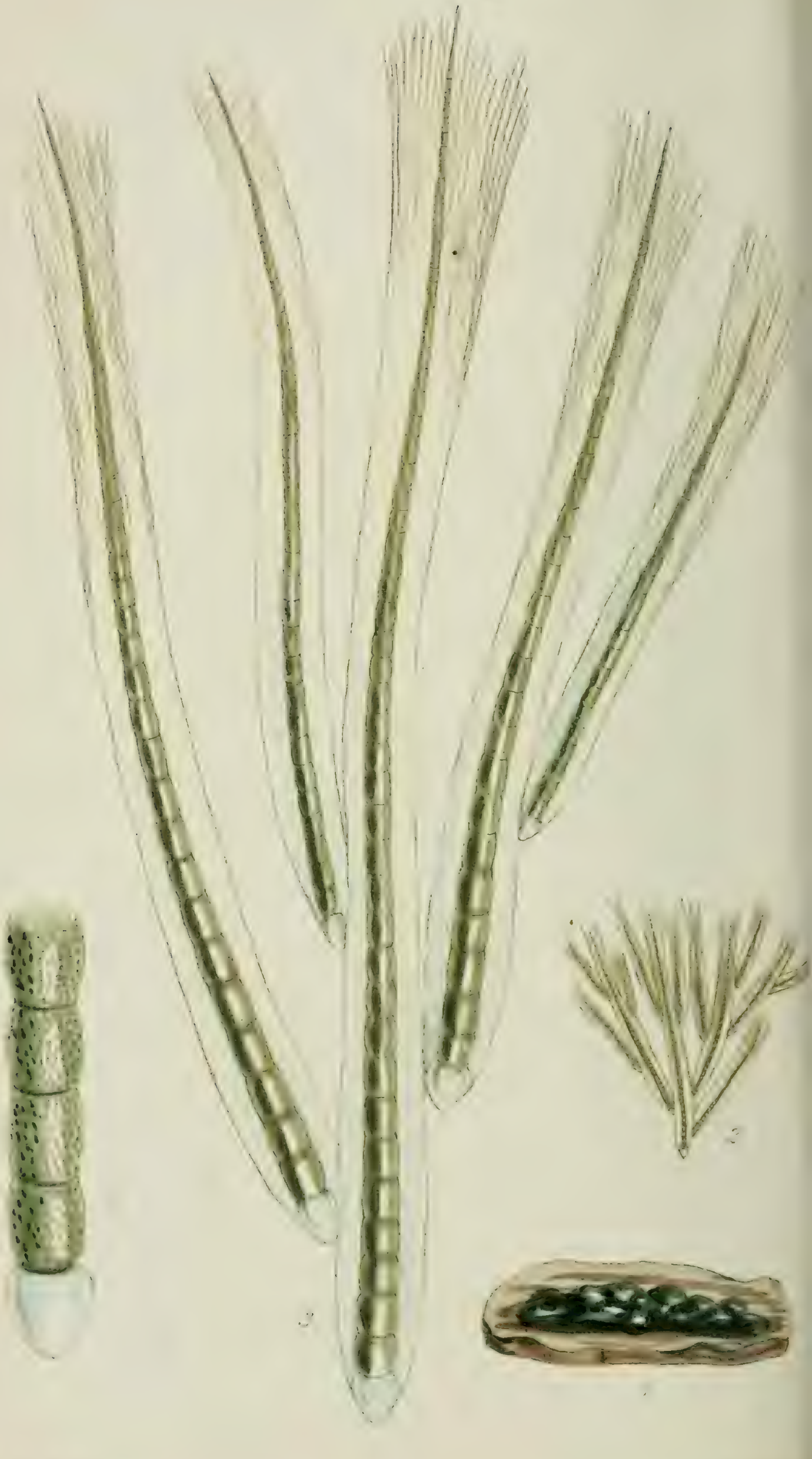
Plate CCCXVI



F. Reeve

PLATE CCCXVI.

SCHIZOSIPHON WARRENIÆ, *Casp.*

GEN. CHAR. *Frond* globose or lobed, gelatinous, composed of closely-packed, annulated, radiating, sheathed filaments, each of which springs from a pellucid cell. *Sheath* gelatino-membranous, vertically cleft into innumerable hair-like shreds. SCHIZOSIPHON *(Kütz.)*,—from *σχιζω, to divide,* and *σιφων, a tube.*

SCHIZOTHRIX *Warreniæ*; "fastigiately branched; the lowest cell of the branches wider, hemispherical, lateral; sheaths dark-coloured, the fibres often spiral; apices of the branches much attenuated." *Casp.*

SCHIZOSIPHON Warreniæ, *Caspary in Ann. and Mag. Nat. Hist.* 3rd series, vol. vi. p. 266. t. 8.

HAB. On rocks at high-water mark, chiefly in places exposed to the dripping of fresh water. Near Mainporth, Falmouth, and at Plymouth, *Dr. Robert Caspary.* Sidmouth, *Rev. R. Cresswell.*

GEOGR. DISTR. —— ?

DESCR. "The plant forms a solid crust over the horizontal rock, to the extent of many square feet, in larger or smaller patches, from $\frac{1}{4}$ to $\frac{1}{2}$ inch in thickness, throwing up on the surface little spherical elevations of different diameter and height." "The colour is, in the fresh state, a dark, dull, blackish-green; in the decayed, a tan-brown, and on the rocks the greater part of the plant is of the latter colour. It feels slimy and slippery." "The stem and branches are, with the exception of the apices, enveloped in a sheath of brownish-green jelly. This sheath is composed of many funnel-shaped, gelatinous tubes, succeeding each other at little distances; the upper part with its thinner end in the wider of the lower, and surrounding the stem in such a way that this seems to be covered with a solid gelatinous mass. The upper end of each tube is split into a great many hair-like threads of very minute diameter, which frequently curl about in an irregular manner, but often represent a phenomenon very rarely found amongst Algæ, that they form a real spiral round the gelatinous cover of one or two branches, or stems." "I have watched the plant from the end of February to the beginning of May, without having found any fruit, or having perceived any alteration in its structure."—*Casp. l. c.* p. 266–268 (*abridged*).

* * *

I have copied the specific character and description of this curious plant from Dr. Caspary's account published in a recent number of Taylor's 'Annals of Natural History,' to which I refer for fuller particulars and a further analysis. In our plate, fig. 3 is a little out of proportion, the sheaths and filaments being too short in proportion to their breadth, a distortion arising from their having been strongly pressed between glasses, for the purpose of separating them. Professor Kützing, who has founded the genus, describes no less than thirty-two species, several of which, probably, may be detected in this country. Whether our *S. Warreniæ* be referable to any of those enumerated, I cannot say, not having had the opportunity of comparing specimens; and being unable to determine the point from the author's short descriptions, in reading over which one is tempted to believe that the thirty-two might well be reduced at least one-half. Be this as it may, the plant now figured was added to our Flora by Dr. Caspary, and has been named by him in honour of Miss Elizabeth B. Warren, of Falmouth, a lady whose researches in natural history amply entitle her to this compliment.

Fig. 1. Cluster of SCHIZOSIPHON WARRENIÆ :—*the natural size.* 2. Sheathed filaments removed and pressed asunder :—*magnified.* 3. Some of the same —*more highly magnified.* 4. Base of filament, with connecting cell :—*highly magnified.*

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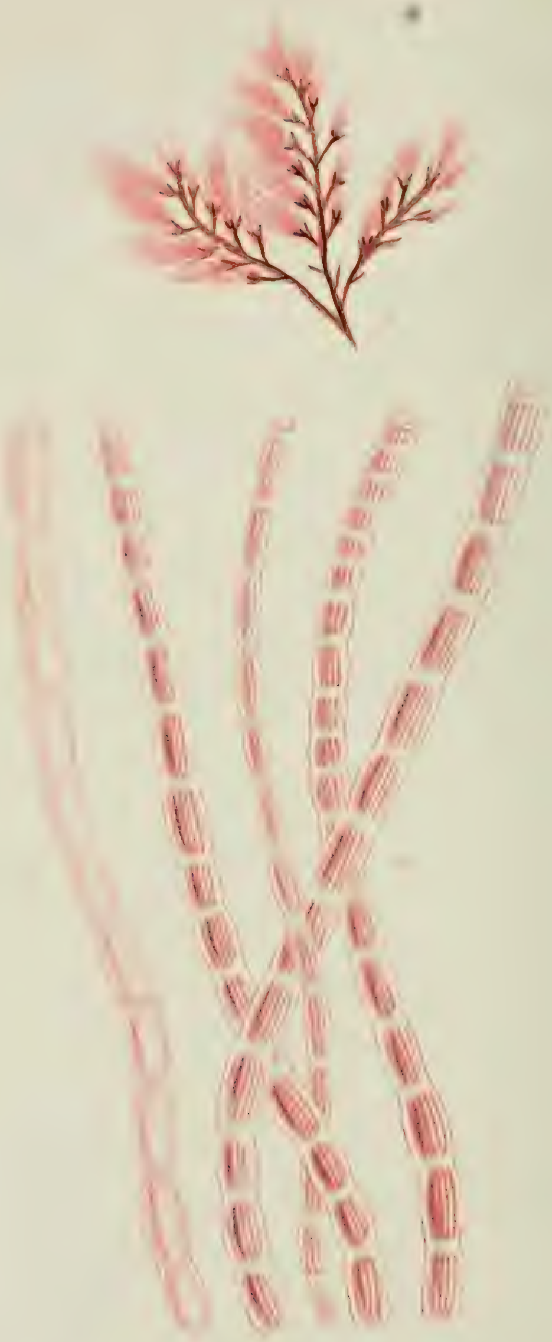

PLATE CCCXVII.

BANGIA? CERAMICOLA, *Chauv.*

GEN. CHAR. *Frond* filiform, tubular, composed of numerous radiating cells, disposed in transverse rows, and enclosed within a hyaline, continuous sheath. *Spores* purple or green, one formed in each of the cells of the frond. BANGIA (*Lyngb.*),—in honour of Hoffman Bang, a Danish naturalist and friend of Lyngbye.

BANGIA *ceramicola*; filaments parasitical, very slender, flaccid, elongated, rosy; articulations once or twice as long as broad, longitudinally striate; the endochrome " at length globular and escaping through the broken tube." (*Carm.*)

BANGIA ceramicola, *Chauv. Recherches,* &c., p. 29. *Harv. Man.* ed. ii. p. 218.

CERAMIUM ceramicola, *Ag. Sp. Alg.* vol. ii. p. 155.

GONIOTRICHUM ceramicola, *Kütz. Phyc. Gen.* p. 244. *Sp. Alg.* p. 358. (*Excl. syn. Carm.*)

CONFERVA ceramicola, *Lyngb. Hyd. Dan.* p. 144. t. 48. D. *Hook. Br. Fl.* vol. ii. p. 355. *Harv. Man.* ed. i. p. 133.

HAB. Parasitical on the smaller Algæ, in tide-pools. Appin, *Captain Carmichael.* Arran, on *Polysiphonia nigrescens, Rev. D. Landsborough.* Torquay, on *Cutleria multifida, Mrs. Griffiths.*

GEOGR. DISTR. Shores of Northern Europe.

DESCR. *Filaments* about an inch or an inch and a half in length, attached at base, floating in the water like tufts of fine floss-silk, extremely slender, but not of equal diameter, some filaments being twice as broad as others, unbranched, articulated. *Articulations* either as long as broad, or, more commonly, twice as long, slightly constricted at the dissepiments, the endochrome finely striate longitudinally, and apparently consisting of radiating cellules placed side by side;—but the exact structure not easily seen after the plant has been dried, in which state, only, have I seen it, and I have not succeeded in getting a transverse section. Sometimes (as at fig. 3) the articulations appear empty; the endochrome having escaped. *Colour* a beautiful rosy red. *Substance* delicately membranaceous. In drying, the plant adheres closely to paper.

Our figure is taken from a specimen communicated by the Rev. D. Landsborough, and exhibits the characters of the plant, so far as it is possible to arrive at them from a dried specimen.

I have not been able to ascertain the exact structure:—the radiated appearance shown in the truncated ends of the magnified filaments, is only *inferred* from the striated surface, which the endochrome presents to a high magnifying power. Whether these striæ are caused by shrinking of the membrane in drying, or whether they are really (as I have supposed) the exterior faces of slender radiating cells, cannot be determined without an examination of a fresh specimen.

I have not seen any specimen from Captain Carmichael, and, therefore, am unable to assert the identity of what I now figure with his plant. My specimens* do not show the running together of the endochrome into a sporidium as he describes, and the articulations, though sometimes short, are more usually twice as long as their diameter.

This plant is referred to *Bangia,* at the suggestion of M. Chauvin. I do not think it strictly accords with the proper structure of that genus; but it may remain in that convenient receptacle until its true structure is fully made out. Should it eventually be made the type of a new genus, I fear Kützing's *Goniotrichum* can scarcely be adopted, because he confounds under that name both *Bangia? elegans,* Chauv., and *Bangia ciliaris,* Carm., two very distinct plants, and the latter a true *Bangia.*

Fig. 1. Tufts of BANGIA? CERAMICOLA, growing on an old piece of *P. nigrescens:—the natural size.* 2. Portions of four filaments, showing the variations of size and length of joints. 3. An empty filament:—*the two last figures very highly magnified.*

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* While this sheet is passing through the press, I have received from Mr. Landsborough a specimen which shows the commencement of the fruiting process described by Carmichael, and in which the articulations are shorter than in the specimen I have figured. I no longer entertain any doubt of the identity of Carmichael's and my plants.

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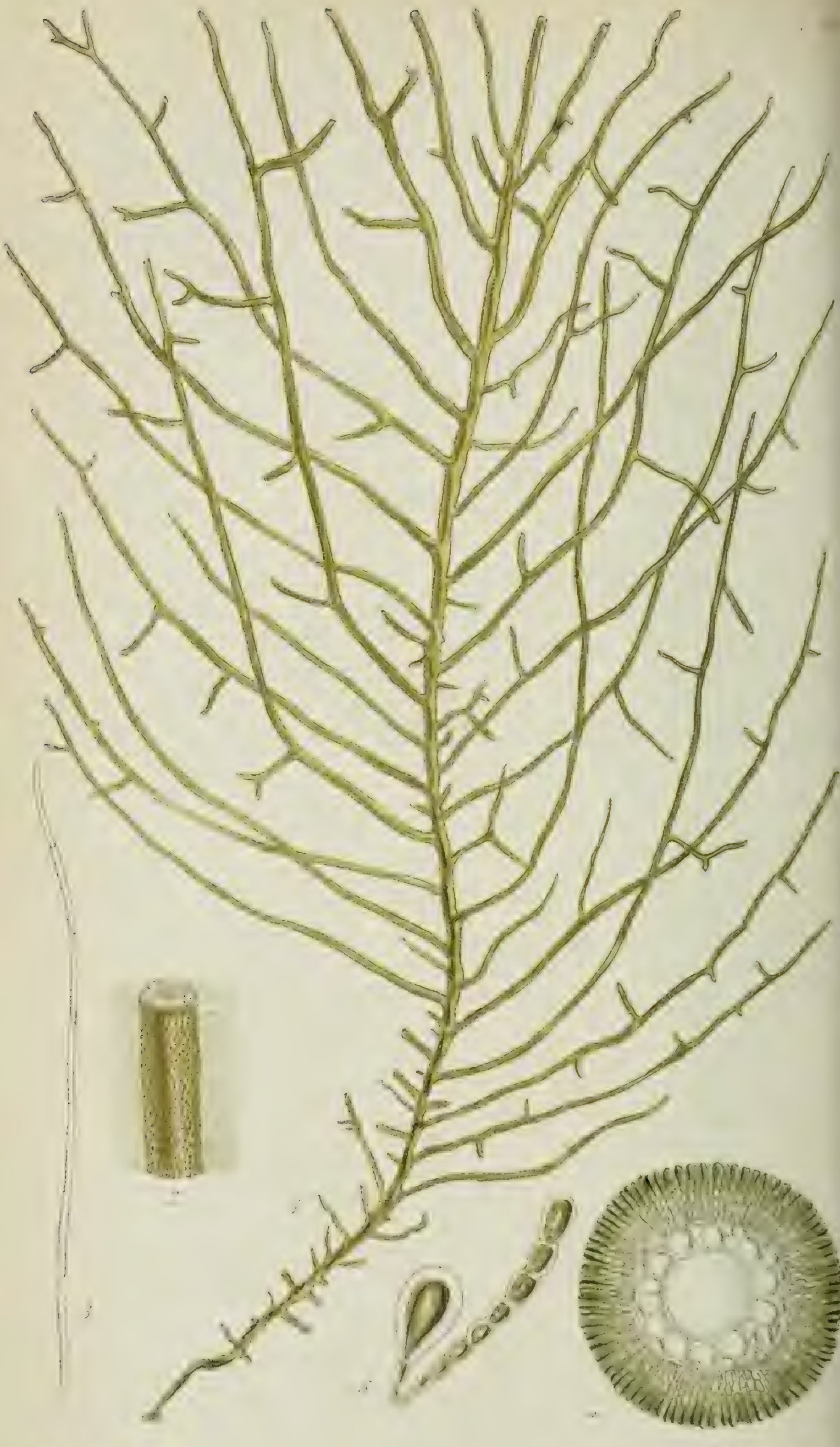

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Plate CCCXVIII.

MESOGLOIA GRIFFITHSIANA, *Grev.*

Gen. Char. *Frond* filiform, much branched, gelatinous; the axis composed of longitudinal, subsimple, interlacing fibres, invested with gelatine; the periphery formed of radiating, dichotomous, coloured filaments. *Fructification*: ovate or elliptical, olivaceous spores, attached to the filaments of the periphery. Mesogloia (*Ag.*),—from *μεσος, the middle,* and *γλοιος, viscid*; from the gelatinous axis.

Mesogloia *Griffithsiana*; frond slender, equal throughout; branches alternate or irregular, filiform, long, simple, nearly bare of ramuli.

Mesogloia Griffithsiana, *Grev. MS. Hook. Br. Fl.* vol. ii. p. 387. *Wyatt, Alg. Danm.* no. 48. *Harv. Man.* ed. 2. p. 47. *Kütz. Sp. Alg.* p. 545.

Hab. In rock-pools between tide-marks, rare. Annual. Summer. Livermead, Torbay, *Mrs. Griffiths.* Sidmouth, *Miss Cutler.* Roundstone, *Mr. M‘Calla.*

Geogr. Distr. Atlantic shores of Europe.

Descr. *Root* a small disc. *Fronds* growing in tufts, filiform, about a line in diameter, and from twelve to eighteen inches in length, with a percurrent, undivided stem, set throughout with long, spreading, slender branches, which are mostly simple and often naked, or having a very few spreading or divaricating branchlets scattered at irregular intervals. When the plant is in a growing state it is clothed with colourless, horizontal fibres, spreading from every portion of the stem and branches, and making them look, when seen under water, of much greater diameter than they really are. In age the axis decays, and the branches become hollow. The filaments of the periphery are closely set, club-shaped, and beautifully beaded. The spores are obovate, and raised in short pedicels. *Colour* a rather pale olive-green, becoming greener in fresh water. *Substance* gelatinous, flaccid, slippery. In drying, the frond shrinks considerably, and adheres closely to paper.

* * *

This species bears a striking resemblance in its ramification to *Chordaria flagelliformis*, but is always of a much paler colour, and the microscopic structure very different; the axis being much less dense, and the substance more gelatinous and tender. Still there is a considerable similarity in structure, and evidently an affinity, through this species, between the two genera.

M. Griffithsiana worthily bears the name of its discoverer, so often mentioned in the pages of this work, who has added so many original observations on the British Algæ to the common stock, and has been the first to notice so many new species. More recently this plant has been gathered on the shores of Heligoland in the Baltic, and also on the northern coasts of France. It is nowhere very common.

Fig. 1. Mesogloia Griffithsiana :—*the natural size.* 2. A portion of a branch :—*slightly magnified.* 3. One of the colourless fibres. 4. Transverse section of the stem. 5. A spore and one of the filaments of the periphery :—*all more or less highly magnified.*

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Plate CCCXIX

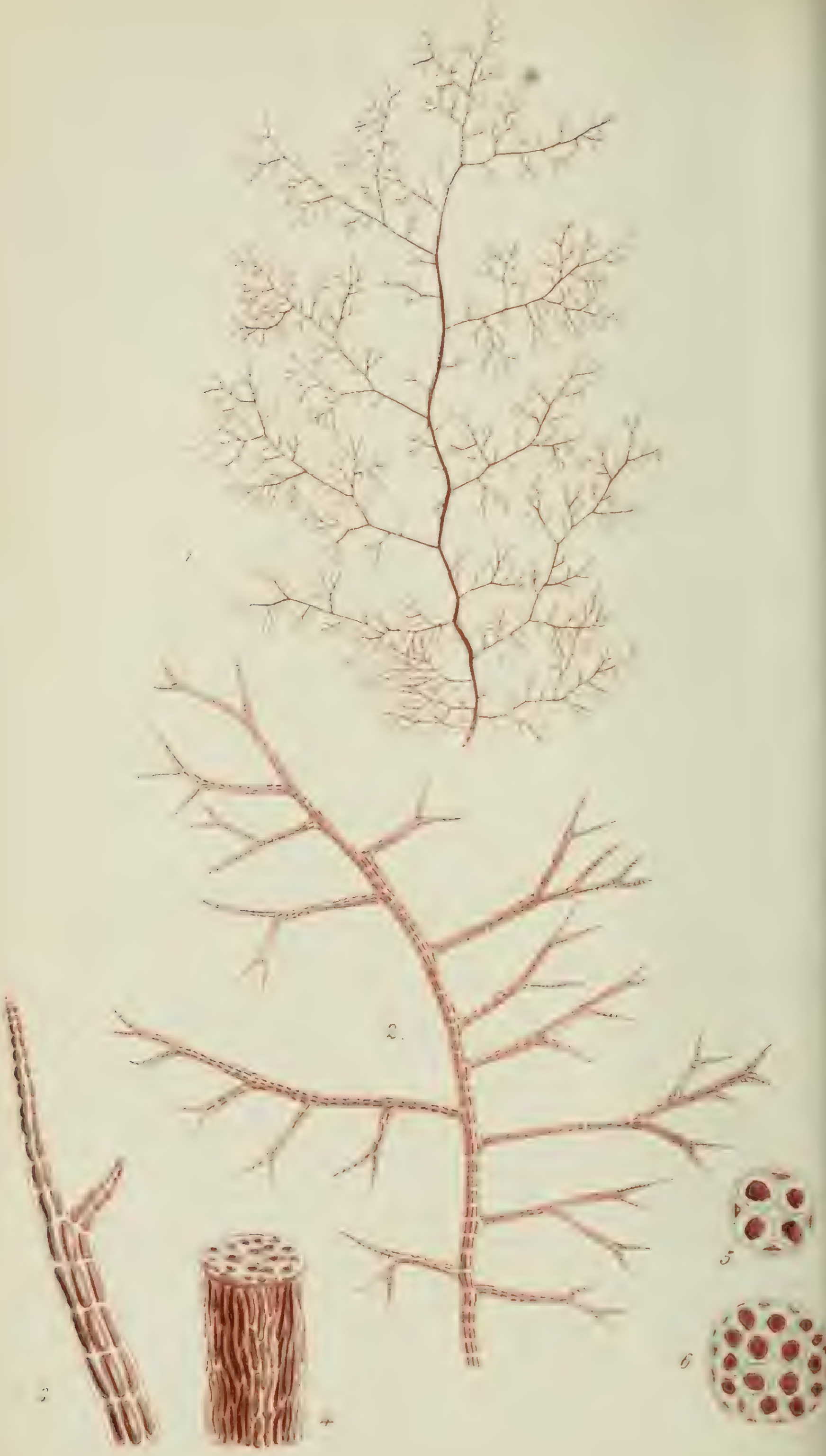

PLATE CCCXIX.

POLYSIPHONIA CARMICHAELIANA, *Harv.*

GEN. CHAR. *Frond* filamentous, partially or generally articulate; joints longitudinally striate, composed of numerous radiating cells or tubes disposed round a central cavity. *Fructification* twofold, on different individuals: 1, ovate *capsules* (*ceramidia*) furnished with a terminal pore, and containing a tuft of pear-shaped spores; 2, *tetraspores* imbedded in swollen branchlets. POLYSIPHONIA (*Grev.*),—from πολυς, *many*, and σιφων, a *tube.*

POLYSIPHONIA *Carmichaeliana*; stem inarticulate, percurrent, flexuous, rigid, set throughout with lateral, alternate, inarticulate, divaricating branches; ramuli scattered, very patent, irregularly forked, articulate; articulations as long as broad, three-tubed.

POLYSIPHONIA Carmichaeliana, *Harv. in Hook. Br. Fl.* vol. ii. p. 328. *Harv. Man.* ed. 2. p. 87.

POLYSIPHONIA divaricata, *Carm. MS.* (*not of Agardh*).

HAB. Parasitical on *Desmarestia aculeata.* Appin, *Capt. Carmichael.* Very rare.

GEOGR. DISTR. (Not known elsewhere.)

DESCR. *Filaments* tufted, but not densely so, about four inches high, rigid, thicker than hog's bristles; *stem* undivided, running through the frond, bent alternately from side to side in a slightly angular manner, inarticulate, furnished throughout with lateral branches. *Branches* widely spreading and divaricating, bent like the stem, and furnished with very patent or horizontal lesser branches, which in their turn bear numerous scattered irregularly-forked ramuli, standing at right angles to the branch from which they grow. The whole aspect of the plant is thorny and irregular, and the substance rigid. The small branches and ramuli are alone articulated; their articulations are about as long as broad, and three-tubed; and a transverse section shows four large primary siphons with external secondary cells at the angles. *Fruit* unknown. *Colour* a dark brown-red, changing to black in drying, in which state the plant adheres very imperfectly to paper.

I here figure a specimen collected by Capt. Carmichael, at Appin, and now preserved in the rich Herbarium of Sir W. J. Hooker. No one but Carmichael has met with this plant, to my knowledge, and he only found it once. Its characters are so peculiar that I formerly considered myself justified in assigning it a specific name. How far I acted wisely may be questioned. At any rate, as it has borne a name in British works for many years, it is right that it should now be figured, that persons visiting the western shores of Scotland may look out for it. Rigid and spiny as it looks, I have sometimes thought that it may be only an extravagant form of *Pol. fibrillosa*.

Fig. 1. POLYSIPHONIA CARMICHAELIANA:—*the natural size*. 2. A portion of a secondary branch with ramuli. 3. Apex of a ramulus. 4. Portion of the stem. 5. Cross section of a small branch. 6. Cross section of the stem:—*all more or less magnified*.

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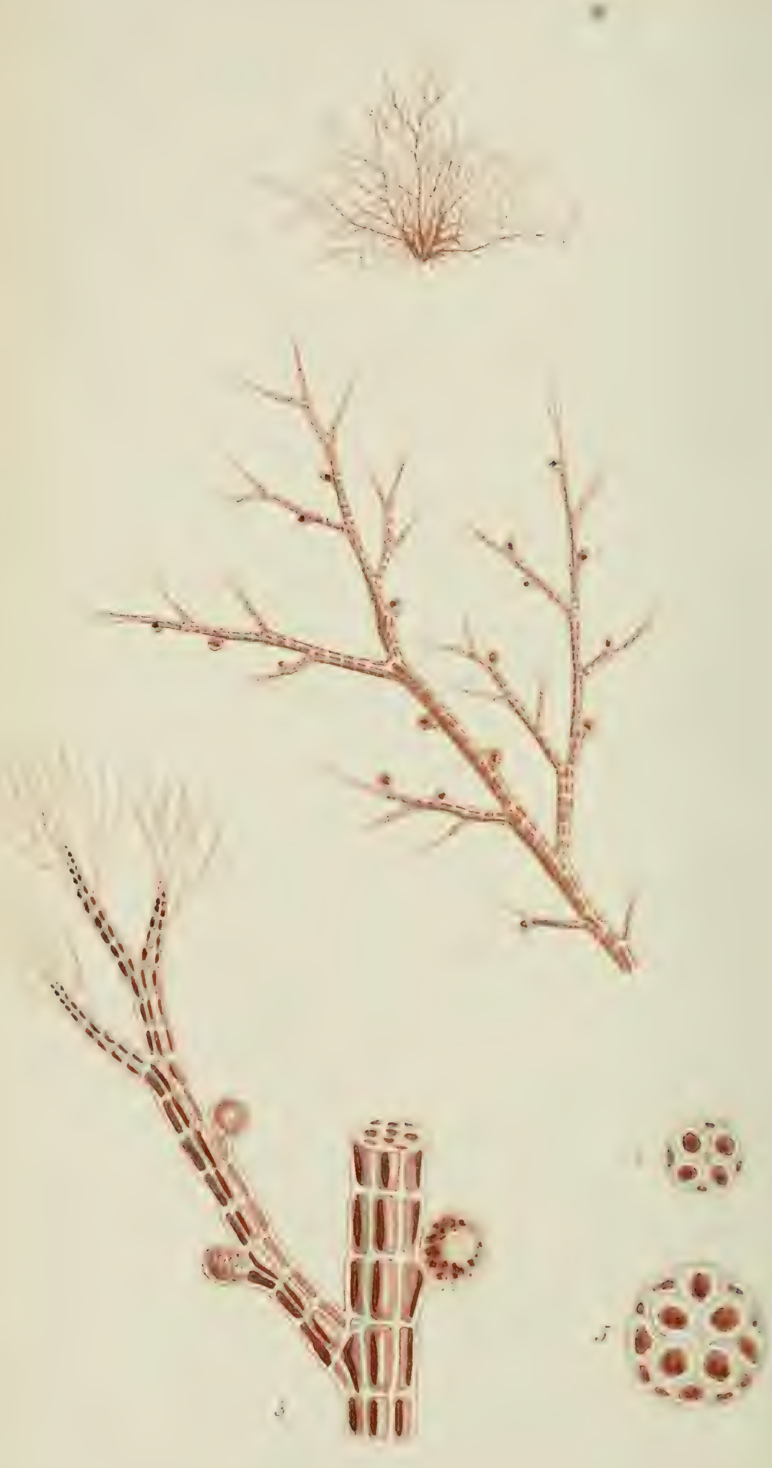

H.H.

PLATE CCCXX.

POLYSIPHONIA SPINULOSA, *Grev.*

GEN. CHAR. *Frond* filamentous, partially or generally articulate; joints longitudinally striate, composed of numerous radiating cells or tubes disposed round a central cavity. *Fructification* twofold, on different individuals: 1, ovate *capsules* (*ceramidia*) furnished with a terminal pore, and containing a tuft of pear-shaped spores; 2, *tetraspores* imbedded in swollen branchlets. POLYSIPHONIA (*Grev.*),—from πολυς, *many*, and σιφων, a *tube*.

POLYSIPHONIA *spinulosa*; "dark red; branches divaricate, somewhat rigid, the ramuli short, straight, subulate, divaricate; articulations about equal in length and breadth, three-tubed; tubercles" (young ceramidia) "globose, sessile, excessively minute." *Grev. l. c.*

POLYSIPHONIA spinulosa, *Grev. Scot. Crypt. Fl.* t. 90. *Harv. in Hook. Br. Fl.* vol. ii. p. 330. *Harv. Man.* ed. 2. p. 84.

HAB. "Sea-shores" (probably in tide-pools) at Appin, *Captain Carmichael.* Very rare.

GEOGR. DISTR. —— ?

DESCR. "*Frond* 1–2 inches in length, of a dark red colour, much branched, with a rigid and spinulose habit; main branches rather remote, irregular, much divaricated, somewhat flexuous; ultimate ramuli straight, subulate, almost thorn-like, divaricated like the rest, sometimes minutely divided at the apex, and each of the divisions terminated in a long, hyaline, jointed filament. *Articulations* about as long as broad, striated with three internal tubes of a pale brown-pink under the microscope. *Tubercles* very minute, quite sessile, round, dark red, scattered freely on the branches, and containing several dark granules."—*Grev. l. c.* A transverse section of the stem (fig. 5) shows four primary siphons of large size, with secondary and tertiary cells at the angles. In drying, the plant adheres to paper.

* * *

One of our rarest species, only found by Captain Carmichael, and by him only once, and now figured from a specimen preserved in the Hookerian Herbarium. The resemblance between *P. spinulosa* and our *P. Carmichaeliana* is great, but *P. spinulosa* is a much smaller and more delicate plant, and its stems are articulated throughout.

I have copied Dr. Greville's specific character and description, and refer to his excellent figure in the 'Scot. Crypt. Flora.' The "tubercles" above described are evidently young ceramidia; the specimen having been collected just as they were putting forth. It is obvious from an inspection of the figure that they are metamorphosed ramuli, occupying exactly the position of ramuli. They are profusely scattered over all the branches of the specimen I examined.

Fig. 1. Polysiphonia spinulosa:—*the natural size.* 2. A branch. 3. A small branch and ramuli, with apical fibres and young ceramidia. 4. Cross section of one of the smaller branches. 5. Cross section of the stem:—*all more or less highly magnified.*

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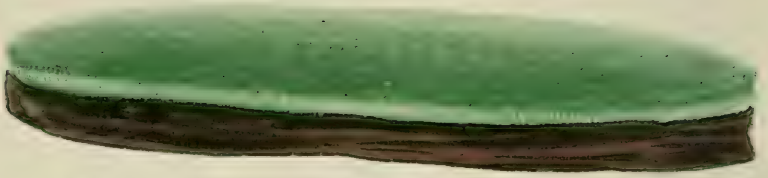
Plate CCCXXI.



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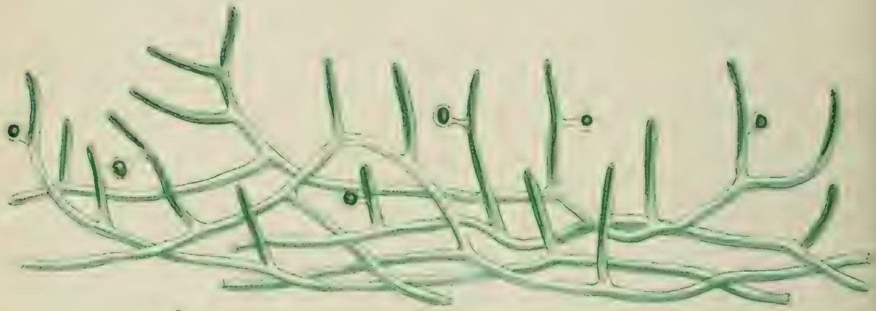

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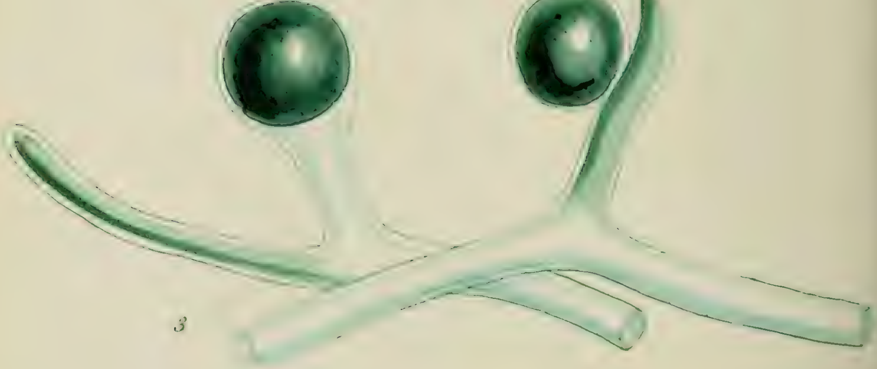

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W.H.H. del et lith. Reeve & Nichols, imp.

PLATE CCCXXI.

VAUCHERIA VELUTINA, *Ag.*

GEN. CHAR. *Fronds* aggregated, tubular, continuous, capillary, coloured by an internal, green, pulverulent mass. *Fructification,* dark green, homogeneous *sporangia* (*coniocystæ*), attached to the frond.—*Grev.* VAUCHERIA (*De C.*),—in honour of *M. Vaucher,* a distinguished Swiss writer upon fresh-water *Confervæ,* &c.

VAUCHERIA *velutina* ; filaments creeping ; branches erect, fastigiate, woven into a velvety stratum ; sporangia solitary, globose, lateral, on short stalks.

VAUCHERIA velutina, *Ag. Syst.* p. 312. *Hook. Br. Fl.* vol. ii. p. 319. *Harv. Man.* ed. 1. p. 147. ed. 2. p. 196. *Kütz. Syst. Alg.* p. 487.

HAB. On the muddy sea-shore, and on mud-covered rocks, between tide-marks, generally above half-tide level. Annual. Spring and summer. Appin, *Capt. Carmichael.* Miltown Malbay ; Ross Begh ; Cushendall, and several other places on the Irish coast, *W. H. H.* (Probably all round the coast.)

GEOGR. DISTR. Shores of Europe.

DESCR. This plant forms widely spreading, velvety patches, from a few inches to several feet in diameter, and from a quarter of an inch to an inch in thickness. The lower part of the mass consists of innumerable, irregularly branching, interwoven, capillary fronds, of a tough membranous consistence ; the larger portion of them being usually dead, with a very offensive odour. The upper stratum of filaments alone exhibits marks of vegetation. The greater portion of each filament is decumbent, but here and there it throws up erect, short branches of nearly equal length, or standing at equal height, and these, closely placed together though originating in separate prostrate threads, from the pile of the velvet-like patch. The lower portions of the tubular filamentous frond are colourless and empty—the upper, and especially the erect branches contain a bright green granular fluid. *Sporangia* globose, very dark green with a pellucid border ; each borne at or near the apex of a short branchlet. *Colour* of the stratum a dark, shining green, when free from mud, which frequently nearly chokes the plant.

The specimen here figured was gathered at Cushendall, on the Antrim coast, where the plant grows in scattered patches, over rocks slightly coated with mud, and covered by every tide. It was in fructification in August, but appeared to be rather past its prime. When properly developed, as on flat, muddy shores, the velvety stratum frequently carpets the mud, with its intense green coating, over a very large extent of surface. The filaments of which the mass consists are inextricably and most closely woven together.

To the naked eye *V. velutina* bears a close resemblance to the fresh-water *V. cæspitosa*, but is less cushioned, and the upright branches forming the pile are shorter.

I take this opportunity of soliciting freshly gathered and fertile specimens of *V. marina* and *V. submarina*, for the purpose of figuring—or the loan and liberty to use drawings of these species made from the living specimen. Dried specimens of these plants are of little value.

Fig. 1. Patch of VAUCHERIA VELUTINA :—*the natural size.* 2. Filiform fronds of which the mass is composed :—*magnified.* 3. Small portions of the same, with fructification :—*highly magnified.*

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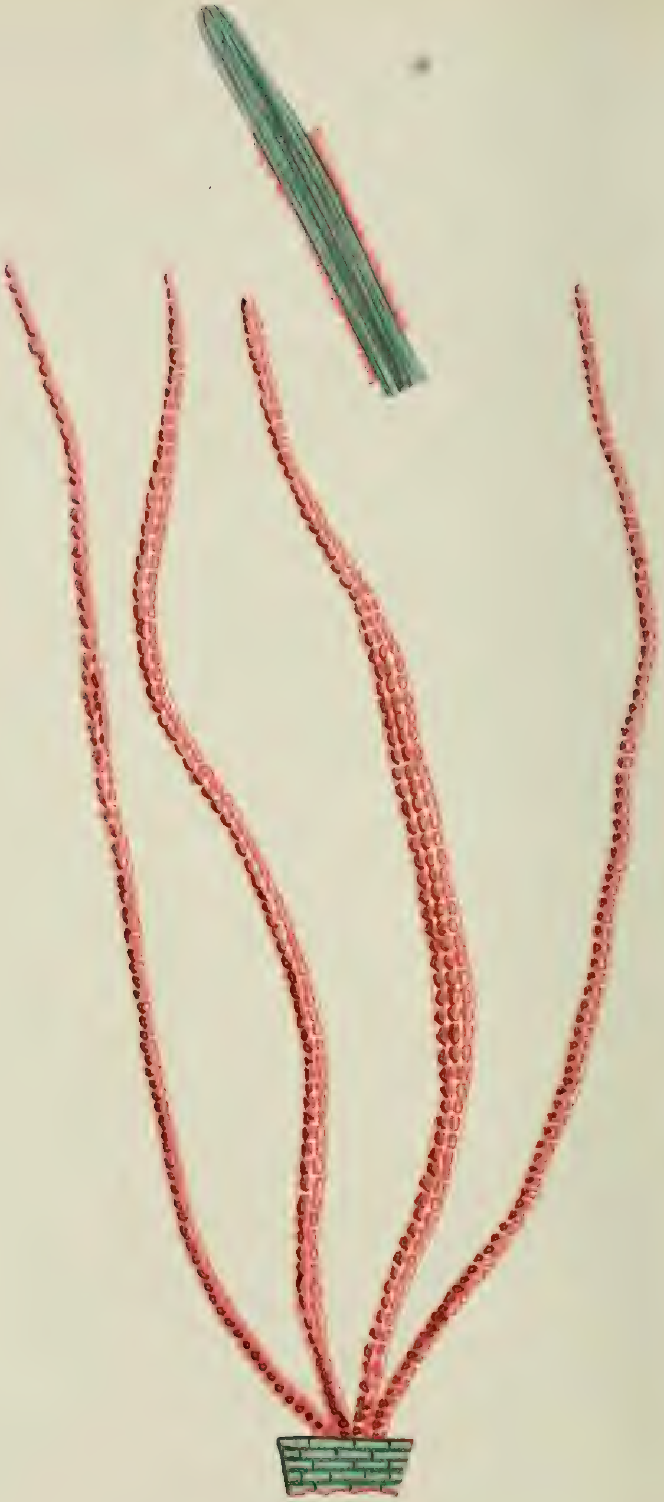

PLATE CCCXXII.

BANGIA CILIARIS, *Carm.*

GEN. CHAR. *Frond* filiform, tubular, composed (in typical species) of numerous, radiating cellules, disposed in transverse rows, and enclosed within a hyaline, continuous sheath. *Spores* purple or green, one formed within each of the cells of the frond. BANGIA (*Lyngb.*), —in honour of Hoffman Bang, a Danish botanist and friend of Lyngbye.

BANGIA *ciliaris*; filaments gregarious, very minute, simple, straight, compressed, purple; grains two or three in each transverse band, globose, sometimes solitary.

BANGIA ciliaris, *Carm. MSS.* *Hook. Br. Fl.* vol. ii. p. 316. *Harv. Man.* ed. 1. p. 172. ed. 2. p. 218. *Chauv. Recherches*, p. 37.

GONIOTRICHUM ceramicola, Var. *a.* simplex? *Kütz. Sp. Alg.* p. 358. (*so far as reference to Carm. and Chauv.*)

HAB. On the margins of old leaves of *Zostera marina*. Annual. Spring. Appin, *Capt. Carmichael.*

GEOGR. DISTR. Shores of Scotland, and the north of France.

DESCR. *Filaments* gregarious, about half a line in length, fringing the leaves of *Zostera* in narrow patches one or more inches in length. Each little thread is erect, straight, or slightly curved, variable in diameter, sometimes containing but a single series or row of granules; oftener containing a double row, and now and then a triple row. All these variations of structure sometimes occur in the same plant, in which case one portion is broader than another, and usually it is the middle portion which is distended. The *granules* are roundish, somewhat depressed at the poles, and of a brilliant purple colour.

* * *

By much the most minute of the genuine species of *Bangia*, and not very different from what the youngest state of *B. fusco-purpurea* may be supposed to be. I have seen no specimens but those found by Capt. Carmichael, and now deposited in the Hookerian Herbarium, and from one of these our figure and description have been taken. Capt. Carmichael describes it as commonly fringing the leaves of *Zostera* at Appin, and probably it may be found in many places where it has been overlooked, its minute size protecting it from all but a very careful eye.

On the other hand, its bright colour will make it be easily detected, when specially sought for.

By comparing the figure now given with that of *Bangia ceramicola* (Plate CCCXVII.), the differences between these species may readily be seen; differences which preclude us from regarding them as states of the same plant, as Kützing supposes. Possibly that acute author, not having seen any specimen of our British plant, first described by Capt. Carmichael, has mistaken some other plant for it.

Fig. 1. Portion of a leaf of *Zostera marina*, fringed with BANGIA CILIARIS:—*the natural size.* 2. Fronds of *Bangia ciliaris*, of different diameters:—*highly magnified.*

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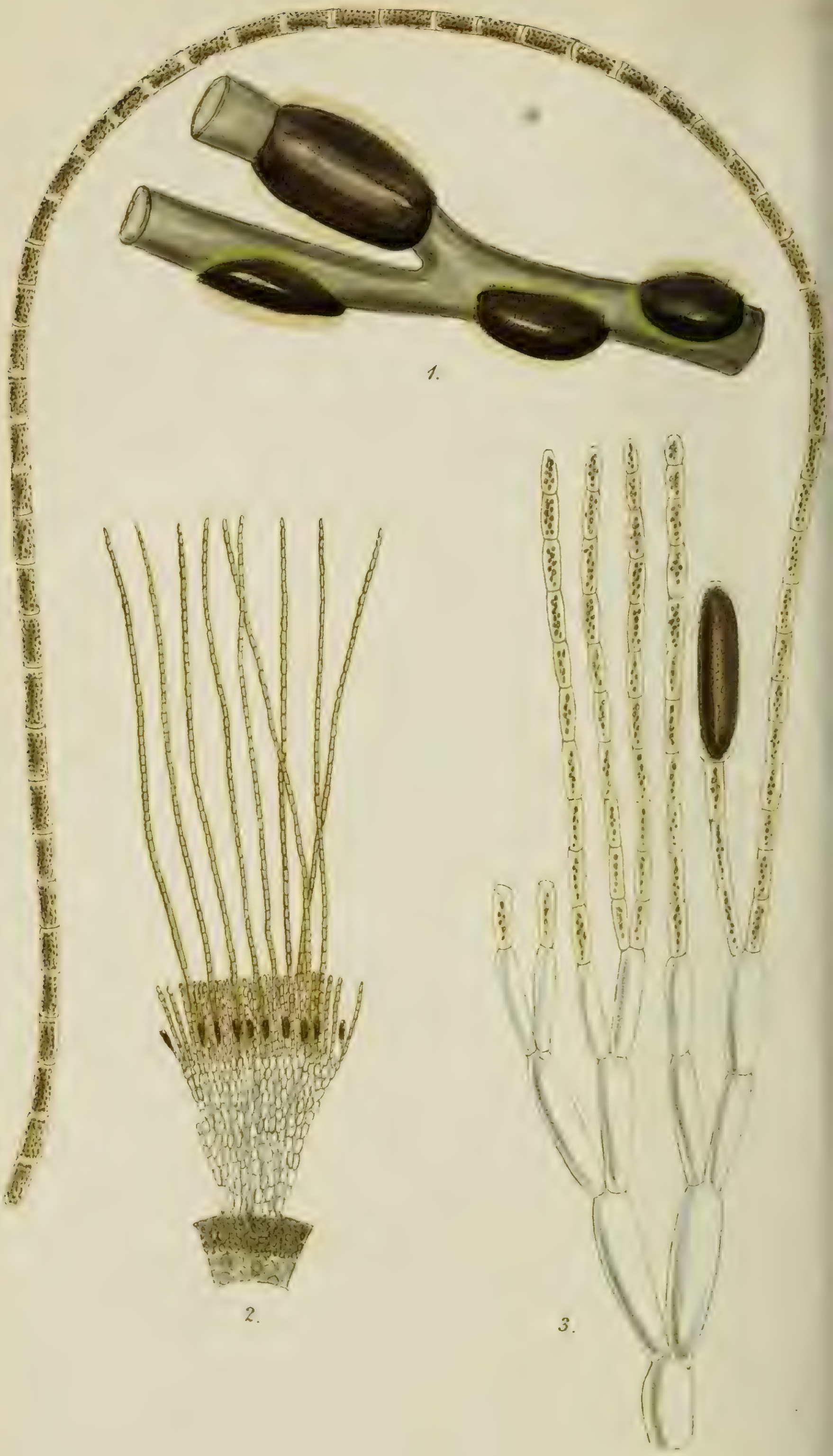
Plate CCCXXI



Reeve & Nichols im

PLATE CCCXXIII.

ELACHISTEA SCUTULATA, *Duby.*

GEN. CHAR. *Frond* parasitical, consisting of a dense tuft of free, simple, articulated, olivaceous filaments, rising from a common tubercular base, composed of vertical branching fibres, closely combined into a cartilaginous mass. *Fructification,* pear-shaped spores attached near the bases of the filaments, concealed in the tubercle, and frequently accompanied by paranemata. ELACHISTEA (*Fries*),—from ελαχιστα, the *least;* from the small size of these plants.

ELACHISTEA *scutulata;* filaments short, rising from an oblong, convex, shield-like tubercle, composed of densely packed, branching fibres; articulations twice or thrice as long as broad; spores oblong.

ELACHISTEA scutulata, *Duby, Bot. Gall.* vol. ii. p. 972. *Harv. Man.* ed. 2. p. 50. *Kütz. Syst. Alg.* p. 540. *J. Ag. Sp. Alg.* p. 11.

CONFERVA scutulata, *Eng. Bot.* t. 2311. *Harv. in Hook. Br. Fl.* vol. ii. p. 355. *Harv. in Mack. Fl. Hib.* part 3. p. 227. *Harv. Man.* ed. 1. p. 132. ed. 2. p. 50. *Wyatt, Alg. Danm.* no. 223.

HAB. Parasitical on the thongs of *Himanthalia lorea.* Annual. Summer and autumn. Very common.

GEOGR. DISTR. Shores of Europe.

DESCR. *Tubercles* forming oblong swellings on the thongs of *Himanthalia,* from half an inch to one, two, or more inches in length, and from a quarter to nearly half an inch in thickness; sometimes extending along the edges of the thong, sometimes occupying its surface, or wholly clasping it round. The *tubercle* is of a very solid, cartilaginous consistence, composed of extremely closely packed, dichotomous, hyaline filaments, whose cells are somewhat pyriform: it continues to grow in thickness as the plant advances to maturity. The apices of these branching filaments, at the outer edge of the tubercle, bear closely-packed *paranemata,* and long, free, penicillate filaments; with *spores* concealed among the paranemata. Penicillate-filaments cylindrical, their cells nearly empty below, toward the apex filled with an olive-coloured granular fluid. *Articulations* about thrice as long as broad. *Spores* oblong, very obtuse at both ends, borne on long pedicels. *Substance* cartilaginous, with a slimy surface. In drying the plant shrinks considerably, and under pressure adheres to paper.

This curious parasite, quite an interesting object under the microscope, is found wherever *Himanthalia lorea* (*Sea-thongs*) abounds. It frequently completely covers the long, strap-shaped receptacle of that plant for the space of several inches, forming swellings of a dark colour and very slippery surface.

By Prof. Kützing this species alone is retained in the genus *Elachistea*, the other species of authors being placed by him either in *Phycophila* or in *Myriactis*. There are some minor differences of structure observable among these plants, chiefly as respects the composition and degree of development of the tubercular base, but there is so close a resemblance in habit, and such an identity of nature running through the whole, that I am unwilling to cumber the science with additional generic names.

Fig. 1. Shields of ELACHISTEA SCUTULATA on part of a thong of *Himanthalia lorea*:—*the natural size.* 2. Vertical slice of a portion of the tubercle, and of the surface of the nurse-plant. 3. Small portion of the same, showing the *short* filaments (or paranemata); a spore; and one of the long filaments, &c.:—*highly magnified.*

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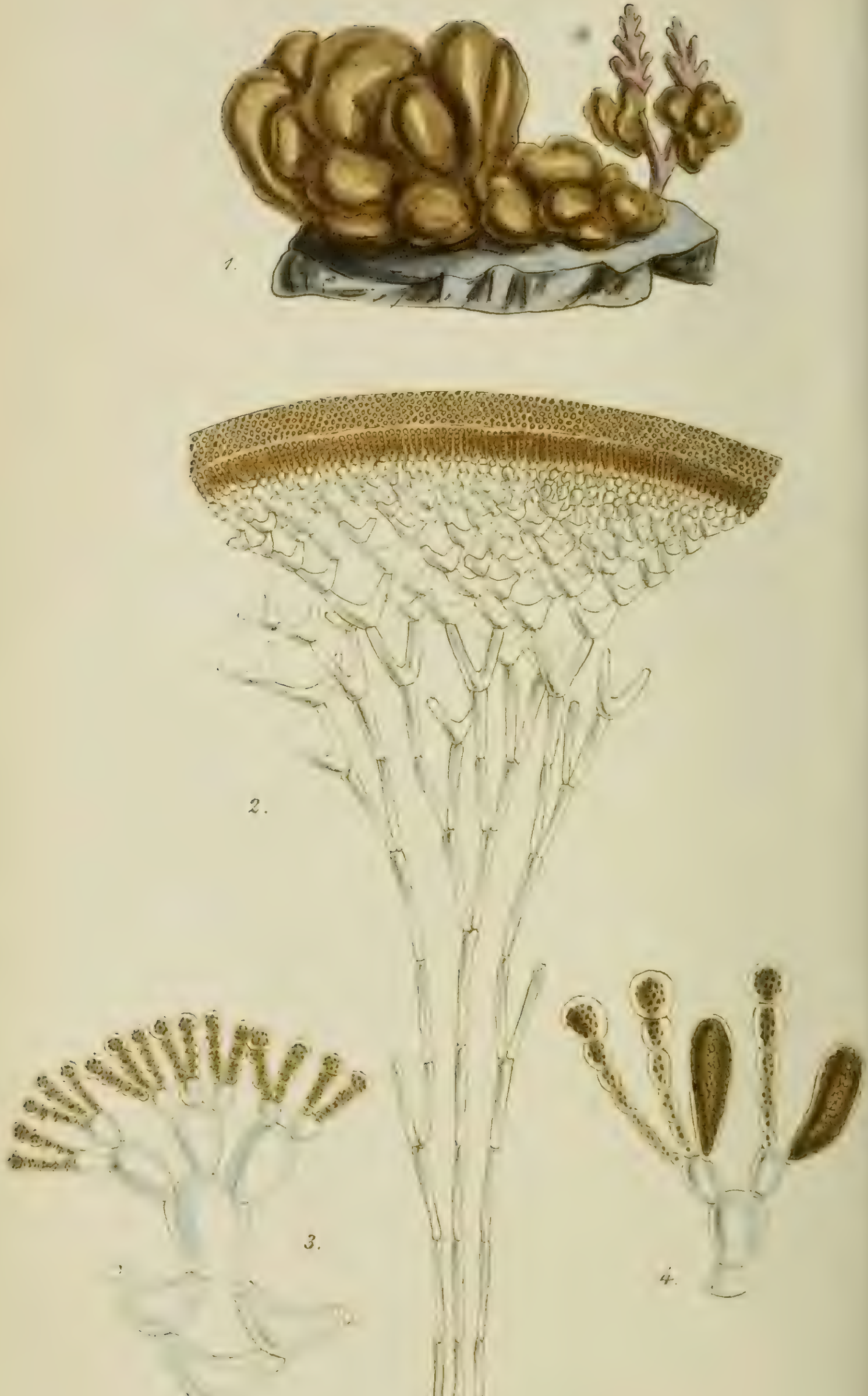
Plate CCCXX.



W.H.H. del et lith

Reeve & Nichols, imp.

Plate CCCXXIV.

LEATHESIA TUBERIFORMIS, *S. F. Gray.*

Gen. Char. *Frond* globose or lobed, fleshy, composed of jointed, colourless, dichotomous filaments, issuing from a central point; their apices, which constitute a fleshy coating to the frond, coloured and tufted. *Fructification*, oval or pyriform *spores*, concealed among the coloured apical filaments. Leathesia (*S. F. Gray*),—in honour of the Rev. G. R. Leathes, a British naturalist; and who first communicated this plant to Sir J. E. Smith.

Leathesia *tuberiformis*; fronds olivaceous, tuberous, when young stuffed with cottony fibres, at length hollow.

Leathesia tuberiformis, *S. F. Gray, Nat. Ar. Br. Pl.* vol. i. p. 301. *Harv. Man.* ed. 2. p. 48.

Leathesia marina, *Endl.* 3*rd Supp.* p. 23. *Kütz. Sp. Alg.* p. 543. *J. Ag. Sp. Alg.* vol. i. p. 52.

Leathesia difformis, *Aresch. Enum. Phyc. Scand.* p. 154. t. 9. f. B.

Corynephora marina, *Ag. Syst.* p. 24. *Harv. in Hook. Br. Fl.* vol. ii. p. 390. *Harv. Man.* ed. 1. p. 46. *Wyatt, Alg. Danm.* no. 149. *Grev. Crypt. Scot.* t. 53. *Harv. in Muck. Fl. Hib.* part 3. p. 184.

Chætophora marina, *Lyngb. Hyd. Dan.* p. 193. t. 66.

Nostoc marinum, *Ag. Disp.* p. 45. *et Syn.* p. 133.

Tremella difformis, *Linn. Syst. Nat.* p. 714. *Huds. Fl. Ang.* vol. ii. p. 565. *With.* vol. iv. p. 82.

Rivularia tuberiformis, *E. Bot.* t. 1956.

Hab. Between tide-marks, on rocks, corallines, and the smaller Algæ; very common. Annual. Summer and autumn.

Geogr. Distr. Atlantic shores of Europe. Baltic Sea. East coast of North America. Cape of Good Hope, common, *W. H. H.*

Descr. *Fronds* when growing on Algæ scattered or solitary, when on rocks usually heaped together and much crowded, forming wide-spreading tuberculated masses, very variable in size, from that of a pea to that of a large walnut. When young, the interior of the tuberous frond is stuffed with weak, empty, dichotomous, cobweb-like fibres, rising from the base and radiating in all directions, but as the outer wall extends, these gradually perish, and the plant becomes a hollow ball. The lowermost cells of the cobwebby fibres are very long and slender; the upper ones become gradually shorter and wider, and are two-horned, or somewhat half-moon-shaped, a new cell springing from each cusp; those which adjoin to the outer wall are small and globose. The outer wall is formed of closely-packed, moniliform, club-shaped, vertical filaments, lying in a transparent jelly; each filament formed of several spherical cells containing olive granules. *Spores* pyriform, sunk among the club-shaped peripheric filaments, with which they appear to be homologous. *Colour* a brownish olive. *Substance* cartilaginous. In drying this plant shrinks considerably, and closely adheres to paper if pressed.

* * *

Common on all our rocky shores, first appearing about April or May in the form of little, pea-like buttons, attached to small Algæ, or grouped in clusters on the surface of rocks and corallines, and, as the season advances, gradually acquiring size; the fronds becoming hollow and cohering in masses. In its young state it constitutes, according to Areschoug, the *Corynophlæa baltica* of Kützing. Not having seen any specimen of the plant so named, I am unable to decide the question.

By most continental authors the specific name *marina* is adopted for this plant, a name which I find for the first time in Agardh's *Dispositio Algarum Sueciæ*, published in 1811. Areschoug alone adheres to the older Linnæan name *difformis*, and if either of these be adopted, the latter is surely preferable, not merely from its elder birth, but because it expresses a natural character of this *deformed*-looking or double-faced plant, while *marina* applies alike to every species of the genus, and even of the family (*Chordarieæ*) to which it belongs:—so that one might as well talk of a *marine sea-weed* as of a *marine Leathesia*. I adopt the name selected by the founder of the genus, and which dates from 1809 (*E. Bot.* t. 1956), because it well expresses the aspect of the plant,—"like a cluster of small potatoes,"—and is at least two years older than *marina*. It is strange that Sir J. E. Smith should have overlooked the *Tremella difformis* of Linnæus, if that plant were rightly taken up by Hudson and Lightfoot.

Fig. 1. LEATHESIA TUBERIFORMIS, in various stages:—*the natural size.* 2. Portion of a longitudinal slice, showing the dense coloured outer wall, or crust, and some of the cobwebby fibres. 3. Apices of the cobwebby fibres, and some of the club-shaped filaments. 4. Some of the same, with *spores*:—*all more or less highly magnified.*

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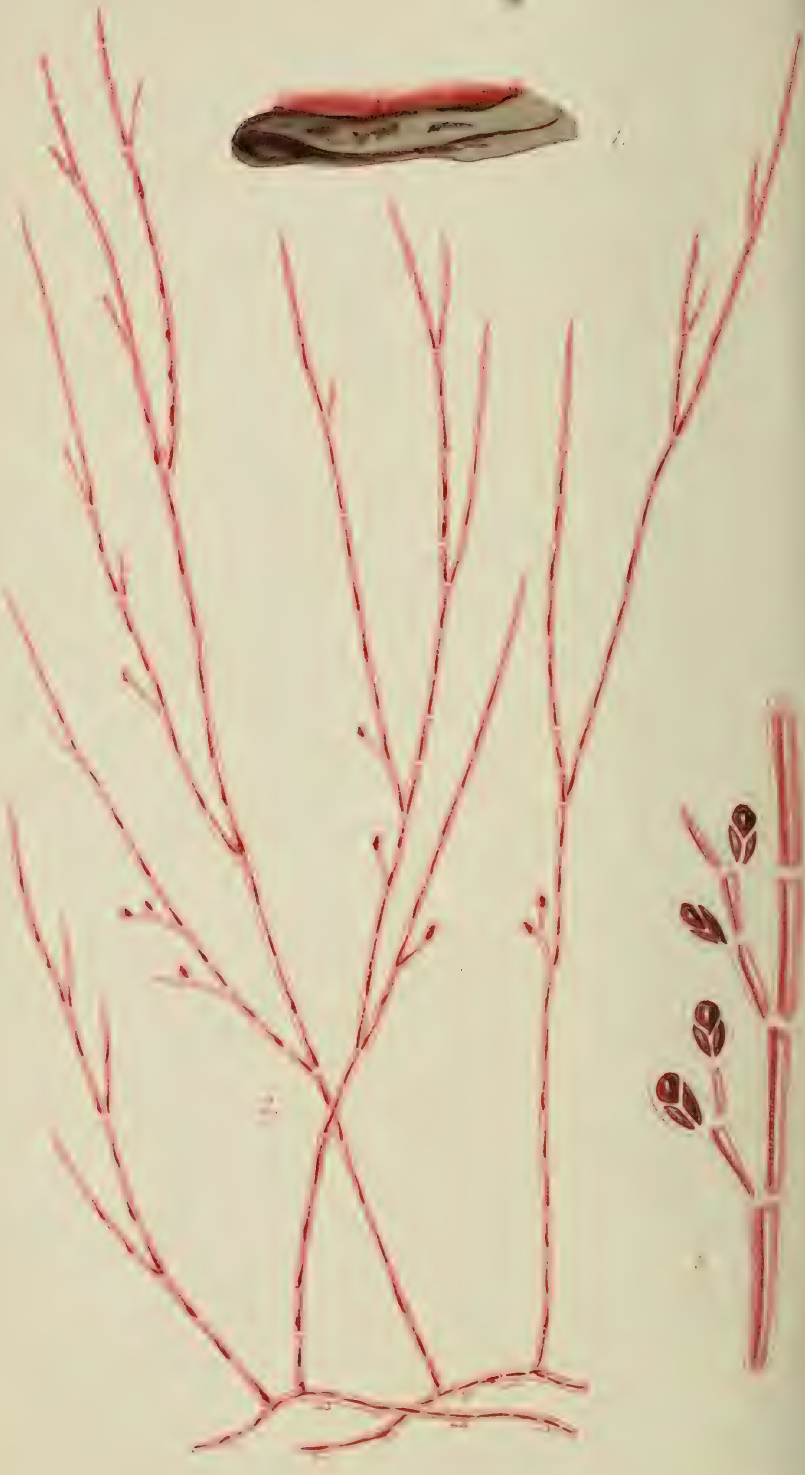
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Plate CCCXXV.

CALLITHAMNION MESOCARPUM, *Carm.*

Gen. Char. *Frond* rosy or brownish-red, filamentous; stem either opake and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds, on distinct plants: 1, external *tetraspores,* scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like receptacles *(favellæ)* seated on the main branches, and containing numerous angular spores. Callithamnion (*Lyngb.*),—from καλλος, *beauty,* and θαμνιον, a *little shrub.*

Callithamnion *mesocarpum*; stems rising from creeping filaments, erect, simple or sparingly branched; branches alternate, very erect, naked, or having a few, scattered, erect ramuli; articulations four or five times as long as broad; tetraspores elliptical, on long, simple or forked, lateral pedicels.

Callithamnion mesocarpum, *Carm. Alg. Appin. MSS.* *Harv. in Hook. Br. Fl.* vol. ii. p. 348. *Harv. Man.* ed. 1. p. 116. ed. 2. p. 184. *Kütz. Sp. Alg.* p. 642.

Hab. On rocks at the extremity of low-water mark, very rare. Appin, *Capt. Carmichael.*

Geogr. Distr.

Descr. "*Tufts* continuous, forming a broad, shaggy, purple crust." *Carm.* *Stems* from an eighth to a quarter inch or rather more in height, springing from decumbent filaments, which are attached to the surface of the rock by little rootlets, erect, simple or having two or three alternate or secund branches. *Branches* issuing at very acute angles, erect, virgate, either quite naked or furnished with a few, distant, erect, scattered, few-jointed ramuli. *Articulations* four or five times as long as broad, with wide borders. *Tetraspores* elliptical, borne on the tips of the lateral ramuli, which are generally one-jointed and either simple or forked, in which case, one arm of the fork is converted into a tetraspore. *Favellæ* unknown. *Colour* a full deep lake. *Substance* membranaceous, adhering to paper in drying.

Capt. Carmichael, in describing this plant, says, "I could not discover that it sprang from creeping filaments;"—a remark which induced me formerly to place it in the section with *C. Rothii* and *C. floridulum.* But on recently inspecting Capt.

Carmichael's original specimens, in the Hookerian Herbarium, I clearly made out the existence of a creeping *rhizome* from which the erect stems spring, and this species should therefore be removed to the section of *C. Turneri* and *C. pluma*. It comes so close, indeed, to some states of *C. Turneri*, particularly to those varieties constituting *C. repens* of authors, that it may fairly be questioned whether *C. mesocarpum* should not be erased altogether from the list of species, and referred as a synonym to *C. Turneri*. Capt. Carmichael's specimen is mixed with fronds of *C. pluma*. This is curious, as both were found growing on bare rocks, and *C. pluma* is well known to prefer the stems of *Laminariæ*.

The figure here given has been prepared from authentic specimens in Herb. Hook. The upper figure (fig. 1) is, of course, imaginary; the specimens examined being merely a few fronds, partly preserved on talc, and partly on paper.

Fig. 1. Tuft of CALLITHAMNION MESOCARPUM:—*the natural size*. 2. Some of the fronds:—*magnified*. 3. Portion of a branch with tetraspores:—*highly magnified*.

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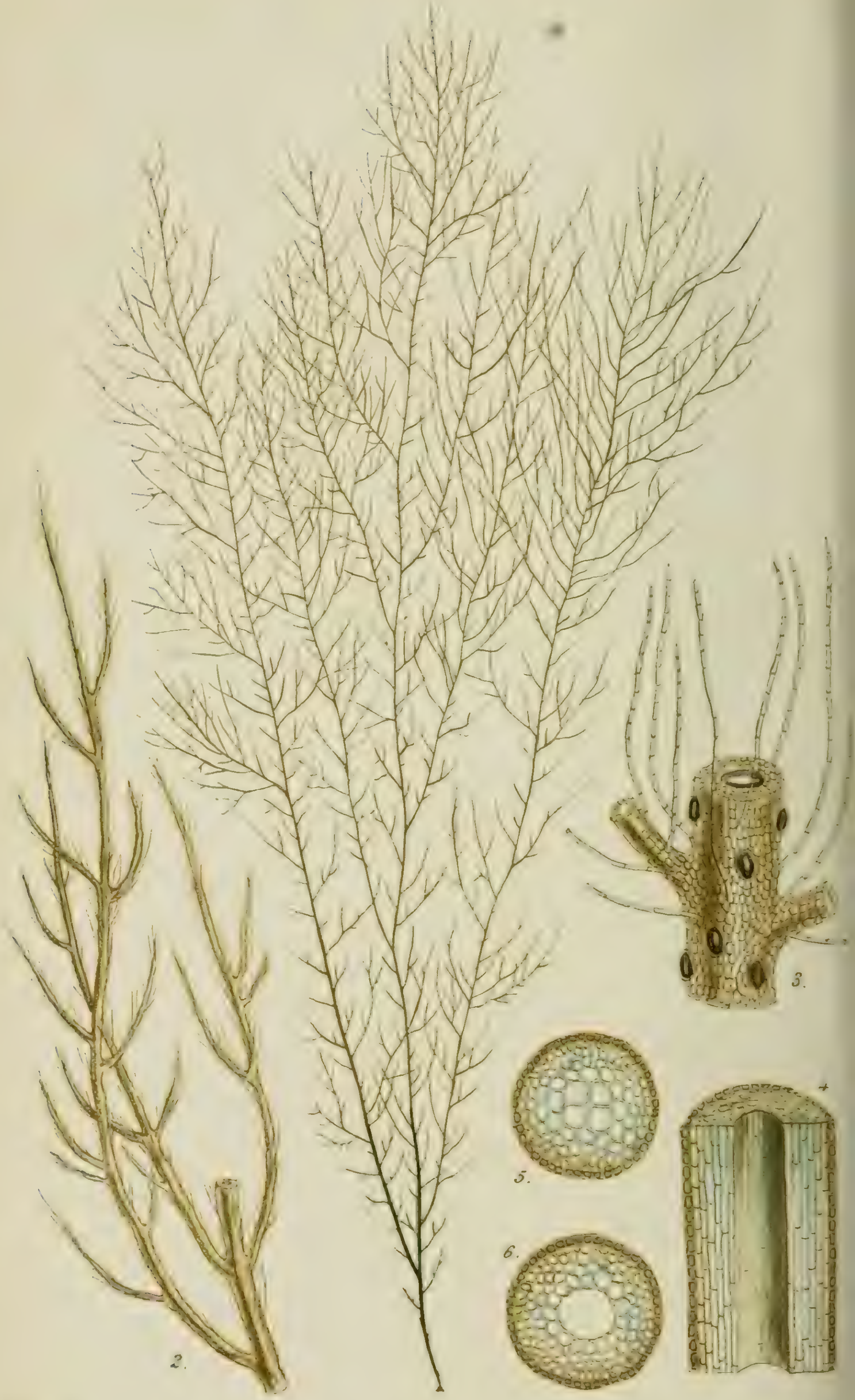
Plate CCCXXV



W. H. H. del et lith.

Reeve & Nichols imp.

PLATE CCCXXVI.

DICTYOSIPHON FŒNICULACEUS, *Grev.*

GEN. CHAR. *Root* a small, naked disc. *Frond* filiform, tubular, branched; its walls composed of several rows of cells, of which the inner are elongated, and connected in longitudinal filaments; the outer small, polygonal, forming a membrane. *Fructification,* solitary or aggregated naked *spores,* scattered irregularly over the surface. DICTYOSIPHON (*Grev.*),—from δικτυον, a *net,* and σιφων, a *tube*; because the frond is hollow, and has a netted surface.

DICTYOSIPHON *fœniculaceus*; frond setaceous, very much branched; branches capillary, decompound; ramuli subulate, alternate or scattered, rarely opposite.

DICTYOSIPHON fœniculaceus, *Grev. Alg. Brit.* p. 56. tab. viii. *Hook. Br. Fl.* vol. ii. p. 279. *Wyatt, Alg. Danm.* no. 205. *Harv. in Mack. Fl. Hib.* part 3. p. 176. *Harv. Man.* ed. 1. p. 32. ed. 2. p. 40. *J. Ag. Sp. Alg.* vol. i. p. 82. *Kütz. Sp. Alg.* p. 485. *Aresch. Phyc. Scand.* p. 147. t. 6, 7,8 (in part). *E. Bot. Suppl.* t. 2746.

SCYTOSIPHON fœniculaceus, *Ag. Sp. Alg.* vol. i. p. 164. *Ag. Syst.* p. 258. *Lyngb. Hyd. Dan.* p. 63. t. 14.

FUCUS subtilis, *Turn. Hist.* t. 234.

CONFERVA fœniculacea, *Huds. Fl. Angl.* vol. ii. p. 594. *Light. Fl. Scot.* vol. ii. p. 981.

CONFERVA marina fœniculacea, *Dill. Hist. Musc.* p. 16. t. 2. f. 8.

HAB. In rock-pools, between tide-marks, either on stones, or growing parasitically on other Algæ. Annual. Spring and summer. Common on the coast.

GEOGR. DISTR. Atlantic shores of Europe and of North America. Baltic Sea.

DESCR. *Root* a very small disc. *Stem* from six inches to one or two feet or more in length, varying from a quarter to half a line in diameter, generally undivided, but densely furnished throughout its entire length with lateral branches. *Branches* long, similar to the stem, and excessively branched in a very irregular manner. Sometimes the secondary branches are very densely set, capillary, elongated and simple, or nearly so. Sometimes they are short, curved, and twice or thrice divided. Commonly they are decompound and bushy, plentifully furnished with subulate, acute ramuli, which are either scattered or rarely opposite. When young, the whole frond is densely clothed with pellucid, jointed hairs. It is at first solid, but the central cells, which are much larger than the rest, are also weaker and soon perish, leaving the stem and branches fistular. The walls of the tube are composed of several layers of longitudinally connected cylindrical cells, of which the inner ones are elongate, the rest gradually shorter; the cells of the superficial layer (or epidermis) being short and either square or polygonal. *Spores* scattered freely over the branches. (On some individuals I have observed aggregated spores, forming scattered clusters or sori.) *Colour* a pale olivaceous, becoming darker in age and on being dried. *Substance* membranaceous and soft, closely adhering to paper in drying.

A common inhabitant of tide-pools, and not inelegant, especially when clothed with the fine soft hairs which cover its surface closely, when in a young and vigorous state, before it has suffered from the wear and tear of its short existence.

I believe by most British algologists this plant is regarded as *sui generis*, entitled to a clear place in our system of arrangement, and properly referred to the *Dictyoteæ*. But a distinguished Swede, Areschoug, regards it unhesitatingly as an abnormal state of *Chordaria flagelliformis*, in which the horizontal filaments of the periphery have not been developed, and he states that he has found specimens having some of the branches with the structure of *Chordaria*, and some with that of *Dictyosiphon*. This is a subject worth examining, but requiring a very careful and accurate observation.

It is also possible that we have two species, or perhaps more, confounded under this name. I possess specimens collected on the west of Ireland some years ago, having rather a different habit from ordinary forms, and differing in having their spores collected in clusters, as in *Striaria*, but not disposed in transverse bands. To these I once gave the MS. name of *D. fragilis*, which is adopted by Kützing, in his recent 'Systema Algarum.' I have deferred noticing these specimens hitherto, from an unwillingness to multiply doubtful species.

Fig. 1. DICTYOSIPHON FŒNICULACEUS:—*the natural size.* 2. Portion of a branch:—*slightly magnified.* 3. Small part of the same, with *fruit* and some hairs. 4. Longitudinal section of the stem. 5. Transverse section of a young branch. 6. The same, of an older branch, now become hollow: —*all highly magnified.*

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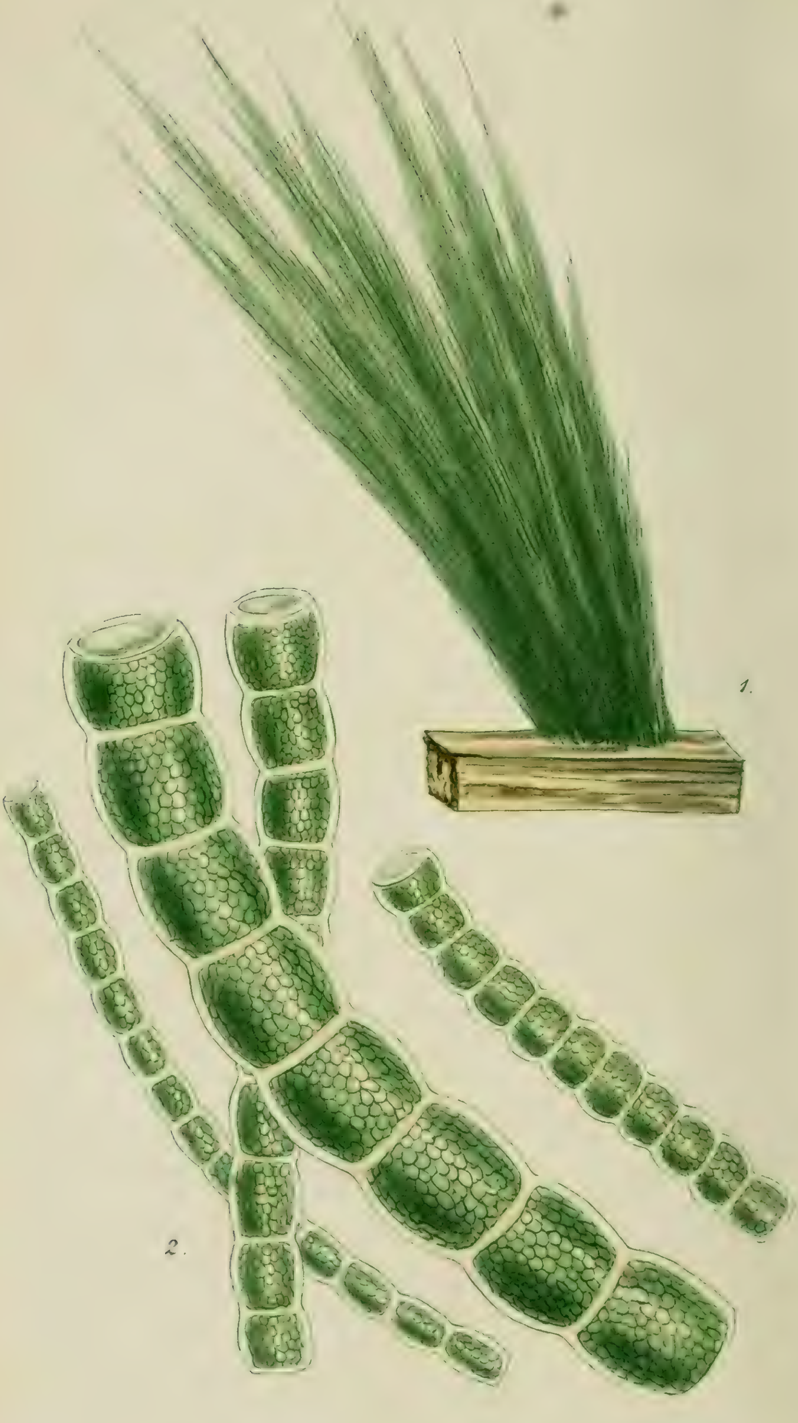

W. H. H. del et lith.

Reeve & Nichols imp.

PLATE CCCXXVII.

CONFERVA COLLABENS, *Ag.*

GEN. CHAR. *Filaments* green, attached or floating, unbranched, composed of a single series of cells or articulations. *Fruit*, aggregated granules or zoospores, contained in the articulations, and having, at some period, a proper ciliary motion. CONFERVA (*Plin.*),—from *conferruminare*, to *consolidate*; because some of the species were used by the ancients for binding up fractured limbs.

CONFERVA *collabens*; filaments elongated, straight, tufted, very thick (but of various diameters), gelatinous and flaccid, of a splendid æruginous green colour; articulations from once to once and a half as long as broad, filled with a dense granular mass.

CONFERVA collabens, *Ag. Syst. Alg.* p. 102. *Harv. in Hook. Br. Fl.* vol. ii. p. 354. *Harv. Man.* ed. 1. p. 130. ed. 2. p. 209.

CONFERVA ærea β. lubrica, *Dillw. Syn.* p. 48.

HORMOTRICHUM collabens, *Kütz. Sp. Alg.* p. 383.

HAB. At Yarmouth, on a floating piece of deal, *Sir W. J. Hooker*. (Only once found.)

GEOGR. DISTR. German Ocean.

DESCR. *Filaments* densely tufted, three or four inches long or more, of very various diameters in the same tuft, the largest ones being twice as thick as *C. ærea* or more, the smaller not measuring one-fourth as much in diameter. *Articulations* generally somewhat longer than their diameter, filled with a brilliantly coloured, granular and dense mass of endochrome; the dissepiments much contracted, and the walls of the cells thick. *Substance* very flaccid and gelatinous, adhering most closely to paper. The *colour* is a peculiarly rich green, and is well preserved in drying.

Dillwyn notices this species, making it a variety of his *C. ærea*, in the following words:—"This curious variety, which was found on the Yarmouth beach by Mr." (Sir William) "Hooker, in the spring of 1808, attached to a piece of deal, differs so extraordinarily from the common appearance of *C. ærea*, that, except under a microscope, nobody would suspect them of being the same. It grew in a very large tuft, and its filaments were remarkably soft, tender, slippery, and glossy, so as to float with the slightest agitation of the water, and adhere closely to paper and glass in drying." To this I have only to add that the figure here given has been drawn from the original specimen, and that no one has since met with a similar one in this country. Kützing, however, states that he has received it from the north of Germany. The filaments differ from each other very extraordinarily in diameter, so that one might suppose there were half a dozen different species under the microscope together. The specific character least variable seems to be the extreme lubricity and softness.

Fig. 1. Tuft of CONFERVA COLLABENS:—*the natural size.* 2. Filaments of various diameters:—*all highly (and equally) magnified.*

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Plate CCCXXV

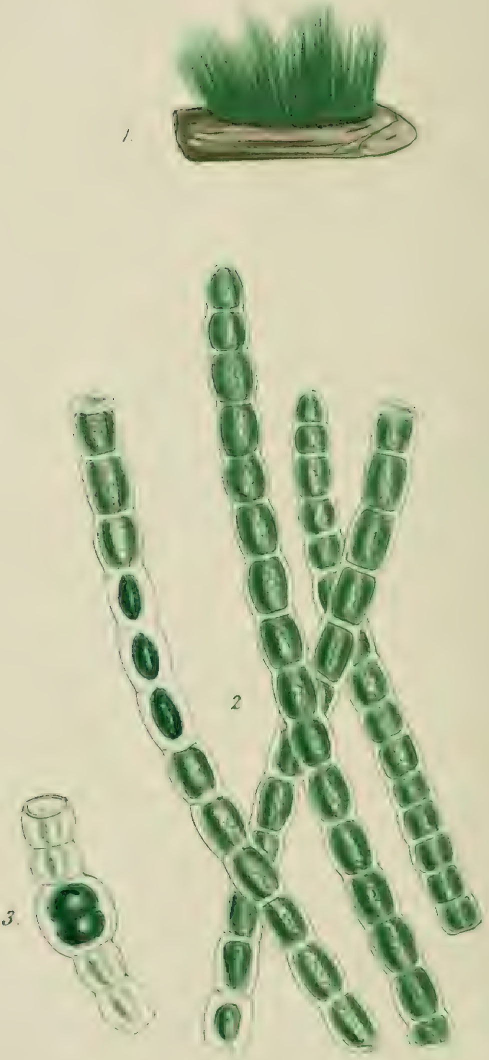

PLATE CCCXXVIII.

CONFERVA YOUNGANA, *Dillw.*

GEN. CHAR. *Filaments* green, attached or floating, unbranched, composed of a single series of cells or articulations. *Fruit,* aggregated granules or zoospores, contained in the articulations, and having, at some period, a proper ciliary motion. CONFERVA (*Plin.*),—from *conferruminare,* to *consolidate*; because some of the species were used by the ancients for binding up fractured limbs.

CONFERVA *Youngana*; filaments short, tufted, straight or nearly so, somewhat rigid; articulations once or twice as long as broad, dissepiments finally contracted.

CONFERVA Youngana, *Dillw. Conf.* t. 102. *Harv. in Hook. Br. Fl.* vol. ii. p. 354. *Harv. Man.* ed. 1. p. 131. ed. 2. p. 210. *Ag. Syst.* p. 101.

CONFERVA isogona, *E. Bot.* t. 1930.

HORMOTRICHUM Younganum, *Kütz. Sp. Alg.* p. 382.

HORMOTRICHUM isogonum, *Kütz. Sp. Alg.* p. 382.

HAB. On rocks and stones near high water-mark, on various parts of the coast. Annual. Summer. Discovered by *W. Weston Young, Esq.,* near Dunraven Castle, Glamorganshire. Yarmouth, *Sir W. J. Hooker.* Dingle Bay, Kerry, *Mr. D. Moore.*

GEOGR. DISTR. Shores of Northern Europe.

DESCR. *Filaments* from half an inch to an inch in length, erect, straight or slightly curved, obtuse, tufted, or spreading in wide shaggy fleeces over the surface of a rock. When young, the filaments are cylindrical, but they soon become contracted at the dissepiments. The cells are occasionally only as long as broad, but are usually once and half as long. The endochrome is granular and dense, filling the cell, and of a full green colour, As it becomes mature it acquires still greater density and a darker colour, and shrinks to half its size. Finally, it is changed into a bipartite sporidium lodged in a swollen and colourless cell. *Substance* membranaceous, not very soft, and having little gloss. In drying, the plant adheres, but not very closely, to paper.

To the naked eye this plant has very much the aspect of *Lyngbya Carmichaelii,* with which (as I have already stated under Plate CCC.) it is properly a congener; but it is readily distinguished under the microscope, by the much longer cells, and, especially in advanced specimens, by the contraction of the tube at the dissepiments. It bears a far closer resemblance to *C. bangioides,* but is a shorter and comparatively stouter plant, and far less lubricous. The contents of the cells also are more granular and dense.

It was originally discovered by Mr. W. Weston Young, a friend of Dillwyn's, to whom that author was indebted for the drawings from which the plates that illustrate his work on the British *Confervæ* were engraved, and to whom he has dedicated this pretty little species.

Fig. 1. Tuft of CONFERVA YOUNGANA:—*the natural size.* 2. Portions of filaments in various stages. 3. Portion of a filament with a ripe sporidium:—*both figures highly magnified.*

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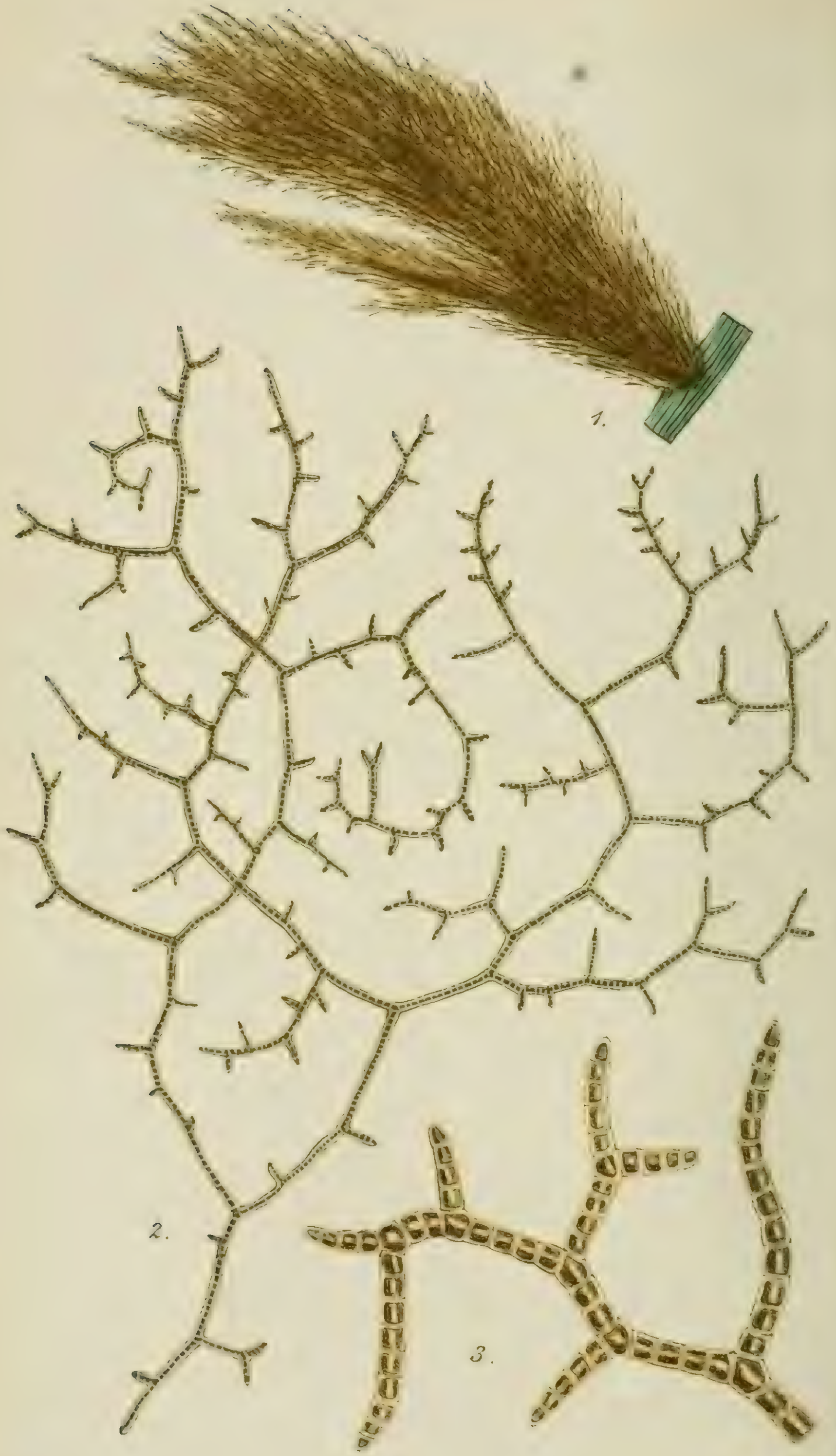
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Plate CCCXXIX.

ECTOCARPUS DISTORTUS, *Carm.*

Gen. Char. *Fronds* capillary, jointed, olive or brown, flaccid, single-tubed, without longitudinal striæ. *Fruit,* either spherical or elliptical, external or imbedded *spores;* or lanceolate, linear, or conical *silicles* (pod-like bodies); or granular masses formed in consecutive cells of the branches. Ectocarpus (*Lyngb.*),—from εκτος, καρπος, *external fruit.*

Ectocarpus *distortus;* filaments very much branched, matted together, dark-brown, angularly bent; branches spreading at very obtuse angles, alternate or secund; ramuli horizontally patent or recurved, scattered, short, spine-like, obtuse; spores obovate, sessile or subsessile.

Ectocarpus distortus, *Carm. Alg. Appin. MSS. cum Ic. Harv. in Hook. Br. Fl.* vol. ii. p. 326. *Harv. Man.* ed. 1. p. 42. ed. 2. p. 60.

Hab. Parasitical on the leaves of *Zostera marina.* Annual. Summer and autumn. Appin, *Capt. Carmichael* (1824), *Rev. D. Landsborough* (1850).

Geogr. Distr.

Descr. *Tufts* from four to eight inches long or more, very dense and full; the threads of which they are composed closely matted together and inextricable. *Filaments* very much branched, and in a very irregular manner between alternate and dichotomous; the branches spreading at very wide angles, forming almost rounded axils, and bent at intervals in a zigzag manner. Lesser branches either spreading at right angles or recurved. *Ramuli* scattered freely along the branches, divaricating, short, spine-like, but obtuse. *Articulations* pretty uniformly as long as broad, enclosing a square mass of dark-coloured endochrome, the walls of the cells thick, leaving wide colourless dissepiments. *Spores* (which I formerly examined on one of Capt. Carmichael's specimens, but which I have not succeeded in finding on the one now figured) obovate or elliptical, scattered, sessile or slightly stalked, dark brown, with a pellucid limbus. *Colour* a deep chestnut-brown. *Substance* membranaceous, and very brittle, if moistened after having been dried. The plant imperfectly adheres to paper.

In a former number, under *E. Landsburgii* (Plate CCXXXIII.) I have pointed out the marks of distinction between that species and the present, its nearest ally. A comparison of the two figures will now enable the student to appreciate the characters of these plants, and, I hope, to discriminate between them. *E. Landsburgii* is not only more thorny in aspect, but is of a far more rigid substance, and much less transparent: nor does it grow in large densely interwoven tufts like *E. distortus*. Both species appear to be of rare occurrence.

The figure now given has been prepared partly from an original drawing by Carmichael, and partly from one of his specimens.

Fig. 1. Tuft of ECTOCARPUS DISTORTUS:—*the natural size*. 2. Portion of a filament, to show the branching:—*magnified*. 3. Small fragment of the same:—*highly magnified*.

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Plate CCCX

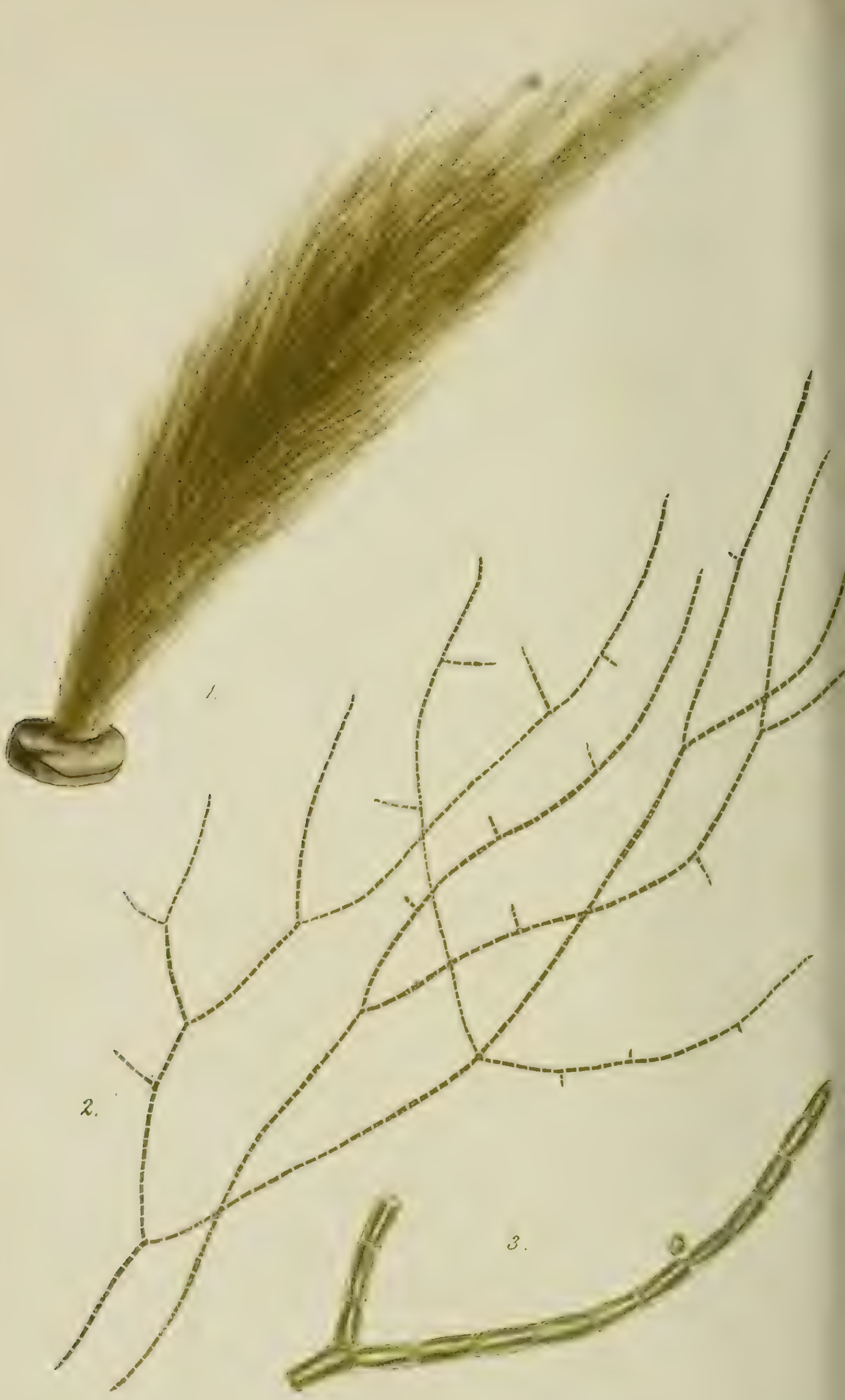

PLATE CCCXXX.

ECTOCARPUS CRINITUS, *Carm.*

GEN. CHAR. *Frond* capillary, jointed, olive or brown, flaccid, single-tubed, without longitudinal striæ. *Fruit*, either spherical or elliptical, external or imbedded *spores*; or lanceolate, linear, or conical *silicles* (pod-like bodies); or granular masses formed in consecutive cells of the branches. ECTOCARPUS (*Lyngb.*),—from εκτος, καρπος, *external fruit.*

ECTOCARPUS *crinitus*; filaments decumbent, forming extensive stratified tufts, sparingly branched; the branches subsimple, distant, elongated; ramuli few, patent; spores globose, scattered, sessile; articulations twice or thrice as long as broad.

ECTOCARPUS crinitus, *Carm. Alg. App. MSS.* *Harv. in Hook. Br. Fl.* vol. ii. p. 326. *Harv. Man.* ed. 1. p. 41. ed. 2. p. 60.

HAB. On muddy sea-shores. Annual. Summer. Rare. Appin, *Capt. Carmichael.* Watermouth, Devon, *Mrs. Griffiths.*

GEOGR. DISTR.

DESCR. *Filaments* from two to six inches long, forming widely spreading, fleecy tufts, which lie prostrate on the mud, at the recess of the tide, and frequently cover wide spaces. *Filaments* sparingly branched (for the genus), the branches long, distant, and subsimple, spreading at wide angles, mostly alternate, rarely opposite. *Ramuli* few, distant, scattered, divaricate or patent, short. *Articulations* twice or thrice as long as broad, containing a pale olive, rather watery endochrome. *Spores* (which I have only seen in a young state) globose, scattered, sessile. *Colour* a pale olive, becoming greener after the plant has been dried, in which state it adheres to paper. *Substance* soft and membranaceous.

I am but imperfectly acquainted with this species, which I have only seen in a dry state; and though I have repeatedly examined several parts of specimens collected by Capt. Carmichael, I have not been able to detect the fructification described by him; save in a single instance that I chanced upon the young spore represented at fig. 3. The nearest affinity of *E. crinitus* seems to be with *E. pusillus*, which has a nearly similar ramification, but is a smaller plant, and almost always found with fruit.

Fig. 1. Tuft of Ectocarpus crinitus:—*the natural size.* 2. Parts of two filaments:—*magnified.* 3. Small portion with a ramulus and young spore:—*highly magnified.*

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Plate CCCXXXI.

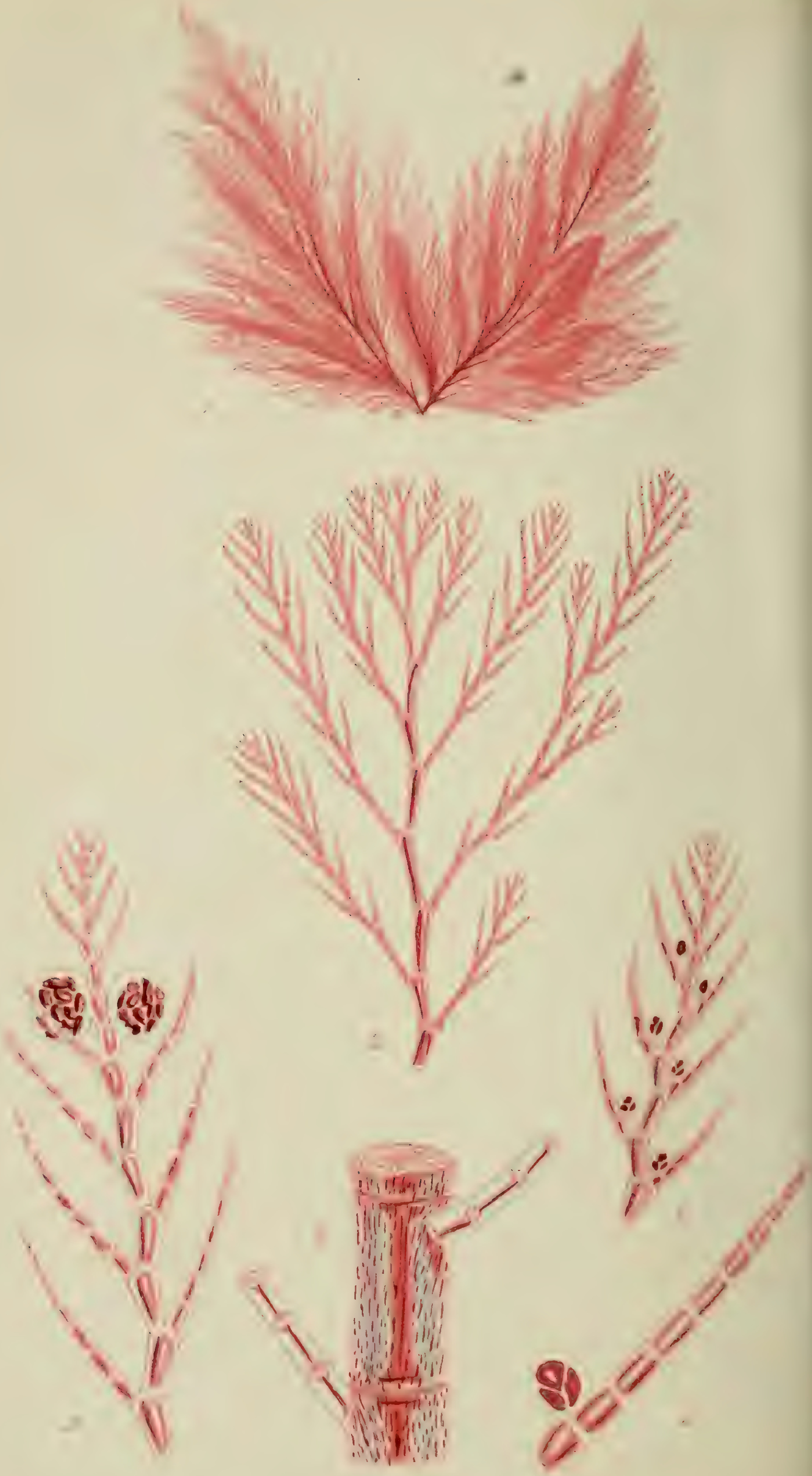

PLATE CCCXXXI.

CALLITHAMNION AFFINE, *Harv.*

GEN. CHAR. *Frond* rosy or brownish-red, filamentous; stem either opake and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds, on distinct plants: 1, external *tetraspores,* scattered along the ultimate branchlets or borne on little pedicels; 2, roundish or lobed, berry-like receptacles *(favellæ)* seated on the main branches and containing numerous angular spores. CALLITHAMNION (*Lyngb.*),—from *καλλος, beauty,* and *θαμνιον, a little shrub.*

CALLITHAMNION *affine*; much branched and bushy, the stem rather opake, full of veins; secondary branches long, having a roundish outline, alternately plumulate; plumules very narrow, simply pinnate; pinnæ short, erect, increasing in length upwards, alternate, crowded at top; articulations of the branches three or four times, of the pinnæ once and a half as long as broad; tetraspores generally solitary, rising from the basal cell of the pinnæ.

CALLITHAMNION affine, *Harv. in Hook. Br. Fl.* vol. ii. p. 344. *Harv. Man.* ed. 1. p. 110. ed. 2. p. 180.

HAB. Parasitical on *Fuci,* between tide-marks. Annual. Summer. Shores of Bute, *Dr. Greville.*

GEOGR. DISTR.

DESCR. *Tufts* two to three inches high, with a somewhat pyramidal outline, the lower branches being longest, the upper gradually shorter. *Filaments* with a percurrent, nearly undivided stem, closely set, on all sides and throughout its whole length, with lateral branches. These are once or twice divided, and clothed with very narrow, elongate, erect, and slender, simply pinnated plumules, alternate, one rising from every joint of the branch. *Pinnules* short, erect, awl-shaped, the lowermost shortest and subdistant, the upper gradually longer and closer together, the terminal ones crowded and short. *Main* stem full of slender veins, and sub-opake, its articulations twice or thrice as long as broad. *Articulations* of the branches thrice or four times as long as broad, with wide margins; those of the pinnules about once and a half as long as broad. *Tetraspores* globose, and mostly solitary, at or near the base of the pinnules. *Favellæ* in pairs, on slightly distorted branches, each favella occupying the place of a suppressed ramulus. *Colour* a deep red, pretty well preserved in drying. *Substance* membranaceous. In drying, the plant adheres closely to paper.

If this plant be really entitled to specific rank, it is well named *affine*, for it appears to be akin to several other species, and to form an intermediate link between them. To *C. Hookeri* it is allied in habit, and in the opacity of the main stem, but here the resemblance ends, for the nature of the ramification is extremely different. With *C. roseum* we may also compare it, but the narrow plumules, with short, erect pinnules, afford a clear mark of distinction. Perhaps, after all, the nearest approach is to *C. polyspermum*, which has plumules equally narrow, and pinnules equally short, and which grows in similar places; but the *solitary*, *basal* tetraspores of *C. affine* seem to point to another species. In making the foregoing contrasts, however, it must be borne in mind that I have compared *C. affine* only with the *normal* states of the species referred to, and no one who has studied the genus *Callithamnion* for any length of time, and in any considerable number of localities, needs to be told that there are many intermediate forms to which it is often difficult to assign the correct name. In the present instance the difficulty has been cut, rather than surmounted, by giving a name to one of these puzzling forms; but though this happened in 1832, no fortunate collector has since met with specimens which could fairly come under our *C. affine*.

Fig. 1. CALLITHAMNION AFFINE:—*the natural size.* 2. Part of a lesser-branch, with its alternate plumules. 3. Branch bearing *favellæ.* 4. Branch with *tetraspores* on the ramuli. 5. A tetraspore on a ramulus. 6. Small portion of the main stem:—*all more or less highly magnified.*

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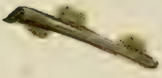
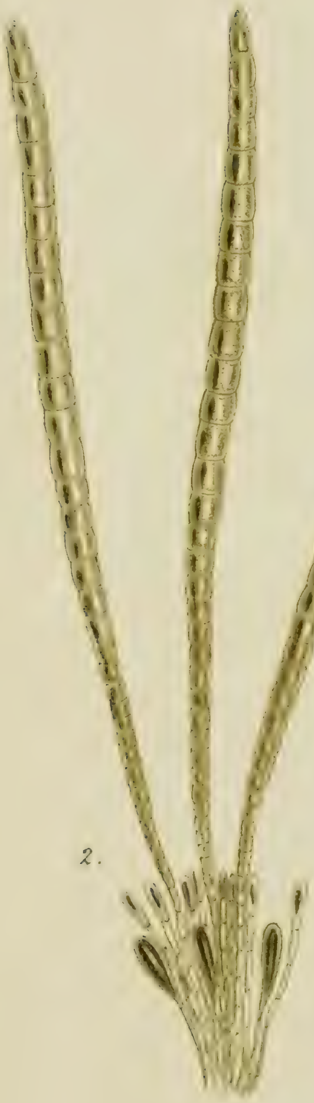
Plate CCCXX





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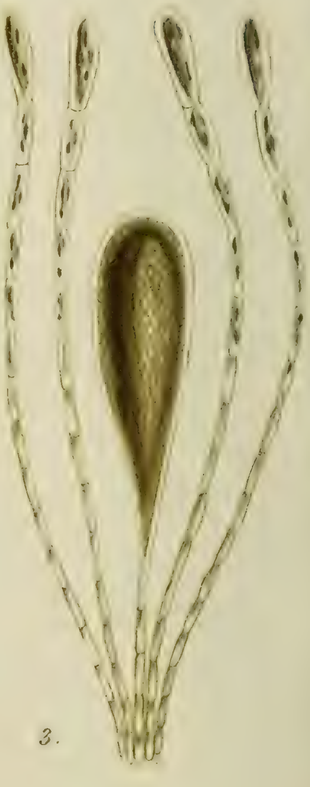

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W.H.H. del et lith

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PLATE CCCXXXII.

ELACHISTEA CURTA, *Aresch.*

GEN. CHAR. *Frond* parasitical, consisting of a dense tuft of free, simple, articulated, olivaceous filaments, rising from a common tubercular base, composed of vertical, branching strings of cells, closely combined into a cartilaginous mass. *Fructification,* pear-shaped *spores* attached to the bases of the filaments concealed in the tubercles, and frequently accompanied by paranemata. ELACHISTEA (*Fries*),—from ελαχιστα, the *least*; from the small size of these plants.

ELACHISTEA *curta*; filaments very short, tapering to the base, obtuse, pencilled, rather rigid, rising from a tubercle; articulations about as long as broad; spores pyriform, on long pedicels; paranemata linear-clavate.

ELACHISTEA curta, *Aresch. in Linn.* vol. xvi. p. 234? *Harv. Man.* ed. 2. p. 50.

CONFERVA curta, *Dillw.* t. 76. *Ag. Syst.* p. 103. *Harv. in Hook. Brit. Fl.* vol. ii. p. 355. *Harv. Man.* ed. 1. p. 132.

HAB. On *Fuci,* between tide-marks. Annual. Summer. At Swansea, *Mr. L. W. Dillwyn.* (Not found recently.)

GEOGR. DISTR.

DESCR. *Tufts* minute, from one to three lines in diameter, with an evident tubercular base. *Filaments* linear-club-shaped, very slender below, and gradually widening upwards, ending in a blunt point. *Paranemata* filiform, composed of slender cylindrical cells, and tipped with a pyriform coloured cell. *Articulations* of the filaments about as long as broad, coloured. *Spores* large, pear-shaped, on longish stalks. *Colour* a brownish-olive, or foxy. *Substance* rather rigid. The plant does not adhere to paper.

This species has long been in doubt, and notwithstanding the figure and description now given, my doubts are not fully removed. By Dillwyn, who first described *E. curta,* it is said to be common in the neighbourhood of Swansea, and probably not rare elsewhere; yet no one has met with it of late years. I have repeatedly brought home the battered stumps of *E. fucicola* in the belief, always dissipated by the microscope, that I had met with *E. curta*; and my only acquaintance with the latter is from an examination of a poor specimen preserved in Sir W. J. Hooker's Herbarium. The accompanying figure has been prepared from that specimen.

Fig. 1. ELACHISTEA CURTA:—*the natural size.* 2. Small part of the tuft:—*magnified.* 3. A *spore*, and four of the paranemata:—*highly magnified.*

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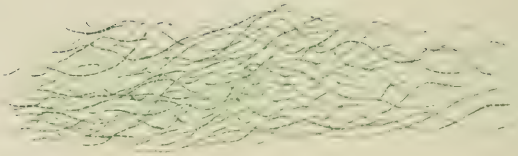
Plate CCCXXXII.



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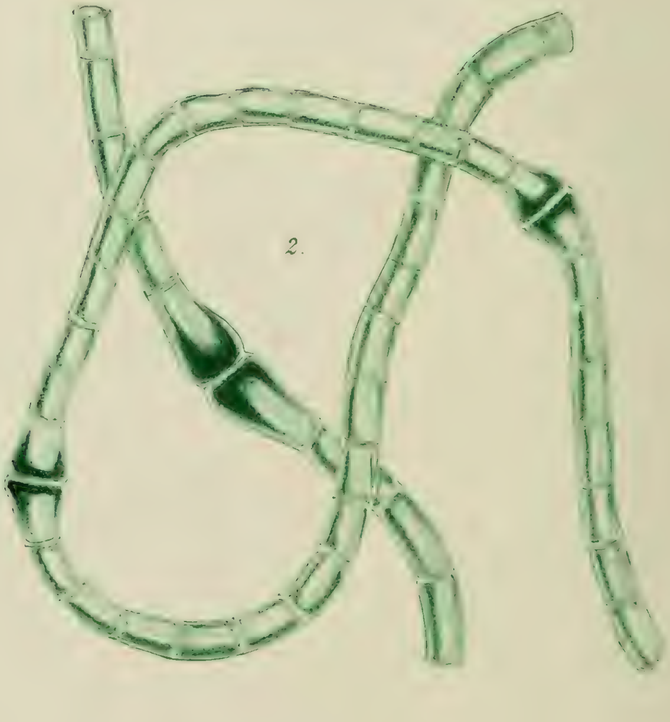

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W. H. H. del et lith.

PLATE CCCXXXIII.

CONFERVA LITOREA, *Harv.*

GEN. CHAR. *Filaments* green, attached or floating, unbranched, composed of a single series of cells or articulations. *Fruit,* aggregated granules or zoospores, contained in the cells, having, at some period, a proper ciliary motion. CONFERVA (*Plin.*),—from *conferruminare,* to consolidate: because some of the species were used by the ancients for binding up fractured limbs.

CONFERVA *litorea*; filaments thick, rigid, crisped, forming loose, extensive bundles of a dull green colour; articulations once and half as long as broad, here and there swollen in pairs and discoloured.

CONFERVA litorea, *Harv. Man.* ed. 2. p. 208.

CONFERVA linum, *Harv. in Hook. Br. Fl.* vol. ii. p. 352. *Harv. Man.* ed. 1. p. 128. *Wyatt, Alg. Danm.* No. 220. (*not of Roth.*)

HAB. In salt-water ditches near the coast; in æstuaries, and along the muddy sea-shore, between tide-marks. Annual. Summer. Appin, *Capt. Carmichael.* Plymouth, *Mrs. Wyatt.* Bangor, North Wales, *Mr. Ralfs.* Orkneys, *W.H.H.*

GEOGR. DISTR.

DESCR. *Filaments* three or four inches long or more, about half the diameter of *C. ærea,* loosely bundled together in prostrate or floating strata of considerable extent, and of a pale green colour, becoming darker and duller as the season advances. Each filament is irregularly curled and twisted, and sometimes angularly bent. The articulations are cylindrical, filled with a pale green watery endochrome, and about once and half as long as broad; and here and there, at irregular intervals, two proximate articulations, longer and broader than the rest, form together a spindle-shaped swelling, in which a dark-coloured endochrome collects, the mass being darkest and densest where the two cells touch each other. This looks like the commencement of fructification, but I am unable to say whether a sporangium is ultimately formed. These dark-coloured double cells are frequently so numerous that they give the filaments, when examined with a pocket lens, a variegated appearance. *Substance* membranaceous, and in drying the plant scarcely adheres to paper.

The above description is intended for the plant commonly found in British Herbaria under the name *C. linum,* Br. Fl., but which (as already stated under t. CL.) is very different from the plant so named by Roth; and has, indeed, more in common with C. *tortuosa,* Dillw. I regret that I have been unable recently to compare my specimens with those found by Carmichael, and I have therefore relied for the *type* of this species on the specimens published in Mrs. Wyatt's 'Algæ Danmonienses,' as that work is in the hands of many persons. It is possible that in some collections more than one plant may be confounded under the name *linum,* Br. Fl., but I trust the figure now given will sufficiently define what I understand by that exploded species. Not having been able to identify our British specimens with any continental species, I have been forced to bestow a new name on them.

Fig. 1. CONFERVA LITOREA :—*the natural size.* 2. Portion of two filaments: —*magnified.*

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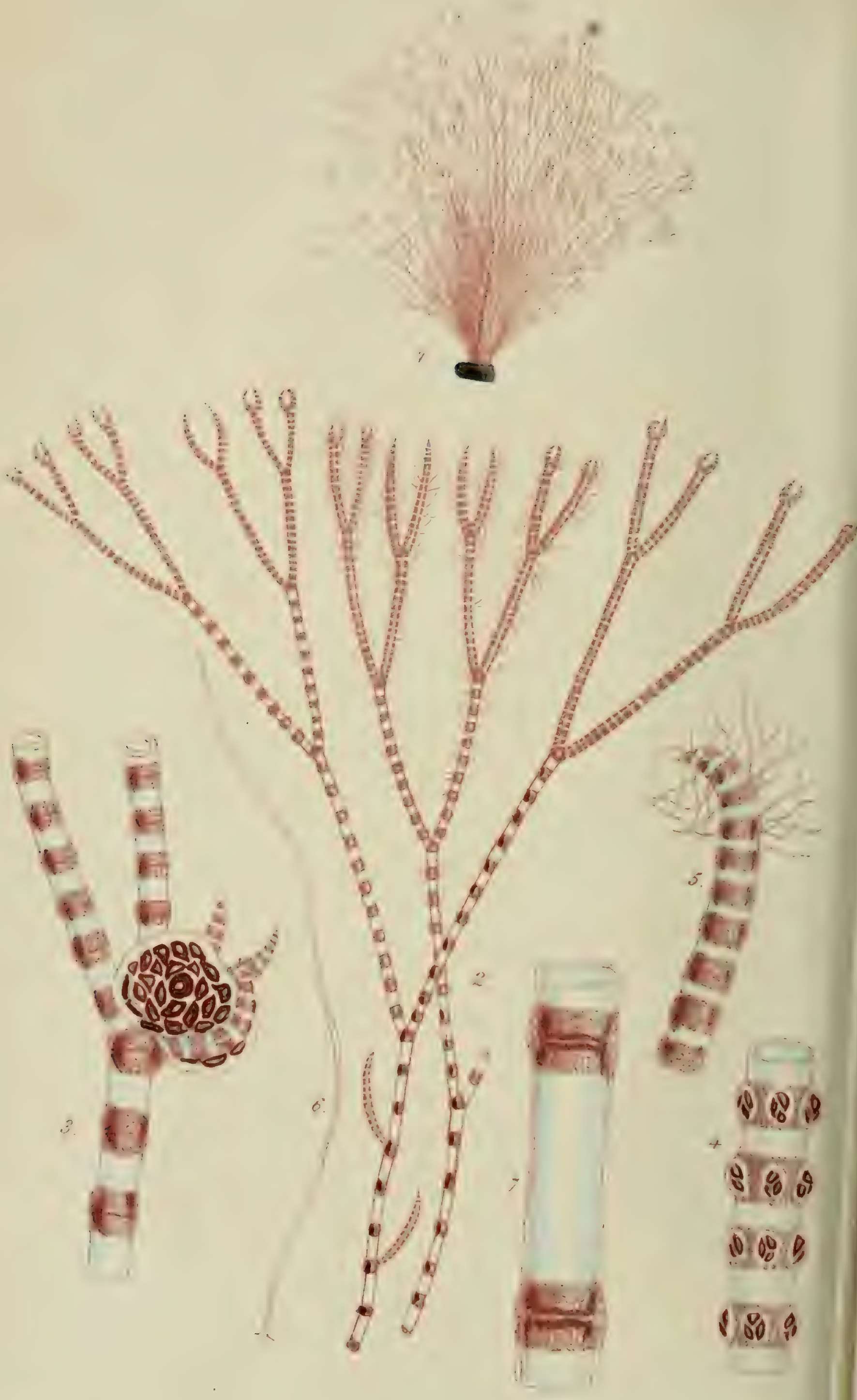

W.H.H. del et Lith.

Reeve & Nichols

PLATE CCCXXXIV.

CERAMIUM STRICTUM, *Kütz.* (sp.)

GEN. CHAR. *Frond* filiform, one-tubed, articulated; the dissepiments coated with a stratum of coloured cellules, which sometimes extend over the surface of the articulation. *Fructification* of two kinds, on distinct individuals: 1, *tetraspores,* either immersed in the ramuli, or more or less protrudent; 2, sessile, roundish *receptacles* (*favellæ*) having a pellucid limbus, containing minute, angular spores, and subtended by one or more short, involucral ramuli. CERAMIUM (*Roth*),—from κεραμος, a *pitcher*; but the fruit is *not* pitcher-shaped.

CERAMIUM *strictum*; frond capillary, nearly equal, membranaceous, irregularly dichotomous, the lower forkings distant, the upper closer, all the divisions erect and straight, with narrow, acute axils; the apices straight or slightly hooked inwards; articulations colourless, those of the lower dichotomies from three to four times as long as broad, of the upper gradually shorter; dissepiments (smooth or hairy) opake, purple; favellæ near the tips of the branches, involucrate; tetraspores erumpent, bursting from the dissepiments of the larger branches, quadrifarious.

CERAMIUM strictum, *Harv. Man.* ed. 2. p. 164.

GONGROCERAS strictum, *Kütz. in Linnæa*, 1842, p. 735. *Phyc. Gen.* p. 380. *Sp. Alg.* p. 678.

HAB. On mussel-shells, corallines, &c.; in tide-pools, near low-water mark. Torquay, *Mrs. Griffiths.* Penzance, *Mr. Ralfs.* Plymouth, *Mr. Boswarva and Dr. Cocks.* Jersey, *Miss Turner.* Dingle, Kerry, *W. H. H.* Roundstone, *Mr. M'Calla.*

GEOGR. DISTR. German Ocean, *Kütz.*

DESCR. *Filaments* capillary, from two to four inches high, densely tufted, the bases of the tufts entangled, from the presence of irregular creeping fibres. *Filaments* of nearly equal diameter throughout, dichotomous, without principal stem, but sometimes furnished with a few lateral ramuli; the lower dichotomies distant, the upper closer; all the segments of the filament straight and erect, the axils acute and narrow; the apices more or less fastigiate, generally sharply bifid, with the points incurved, but not strongly involute. *Articulations* of the middle and lower portions three to four times, of the upper twice as long as broad, and of the ultimate and penultimate forkings much shorter than their breadth. *Dissepiments* coated with dense, minute, purple cells, slightly swollen, either quite smooth, or (when young) clothed with copious, long, slender, flexible hairs. *Favellæ* often situated in a forking of the branch, and generally in one of the uppermost forks, subtended by a few short ramuli. *Tetraspores* prominent, forming a whorl round the joint, in the upper (but not ultimate) divisions of the filament. *Colour* a dark purplish-red. *Substance* delicately membranaceous and soft. In drying the plant closely adheres to paper, and has a peculiar glassy lustre, especially in the colourless portions of the thread.

A beautiful species, and a *tolerably* definite one, considering the genus to which it belongs! It is known from *C. nodosum* by its less patent branching, its more purple colour, and different disposition of the tetraspores, besides minor characters, more readily taken in by the eye than the ear. Sometimes the branches are found quite smooth, and at other times every node of the upper branches and ramuli is densely clothed with long, flexible hairs, which appear to be the same pubescence that Kützing describes, and on the presence of which he founds his genus *Trichoceras*. At first, on noticing these hairs, abundantly clothing a specimen sent by Miss Turner from Jersey, I was disposed to regard them as a specific character, and to suspect that I had before me *Trichoceras villosum* of Kützing. Whether this be so or not, I soon abandoned all thoughts of grounding a species on the presence or absence of such hairs, for I found, on examining numerous splendid specimens sent to me by Mr. Boswarva and Dr. Cocks, that nothing could be more inconstant; branches from the same tuft differing in the degree of hairiness, and specimens from the same locality, and identical in all other characters, being some hairy, some perfectly smooth. Lastly, on re-examining my original Dingle specimens, which had been acknowledged by Kützing himself to be truly his *C. strictum*, I found traces of similar pubescence. And such hairs are by no means restricted to this species, but occur on *C. rubrum*, and probably on most other species. They are, I suspect, organs of the same nature as the *fibrillæ* of *Polysiphoniæ*, and if this be the case we may expect to find *antheridia* on them.

Fig. 1. CERAMIUM STRICTUM:—*the natural size*. 2. Portions of two filaments, one hairy, the other smooth. 3. Part of a branch, with a *favella*. 4. Part of a branch, with *tetraspores* in situ. 5. Apex of a branch, partially clothed with hairs. 6. A hair. 7. An articulation of the lower part of the filament:—all the latter figures *more or less highly magnified*.

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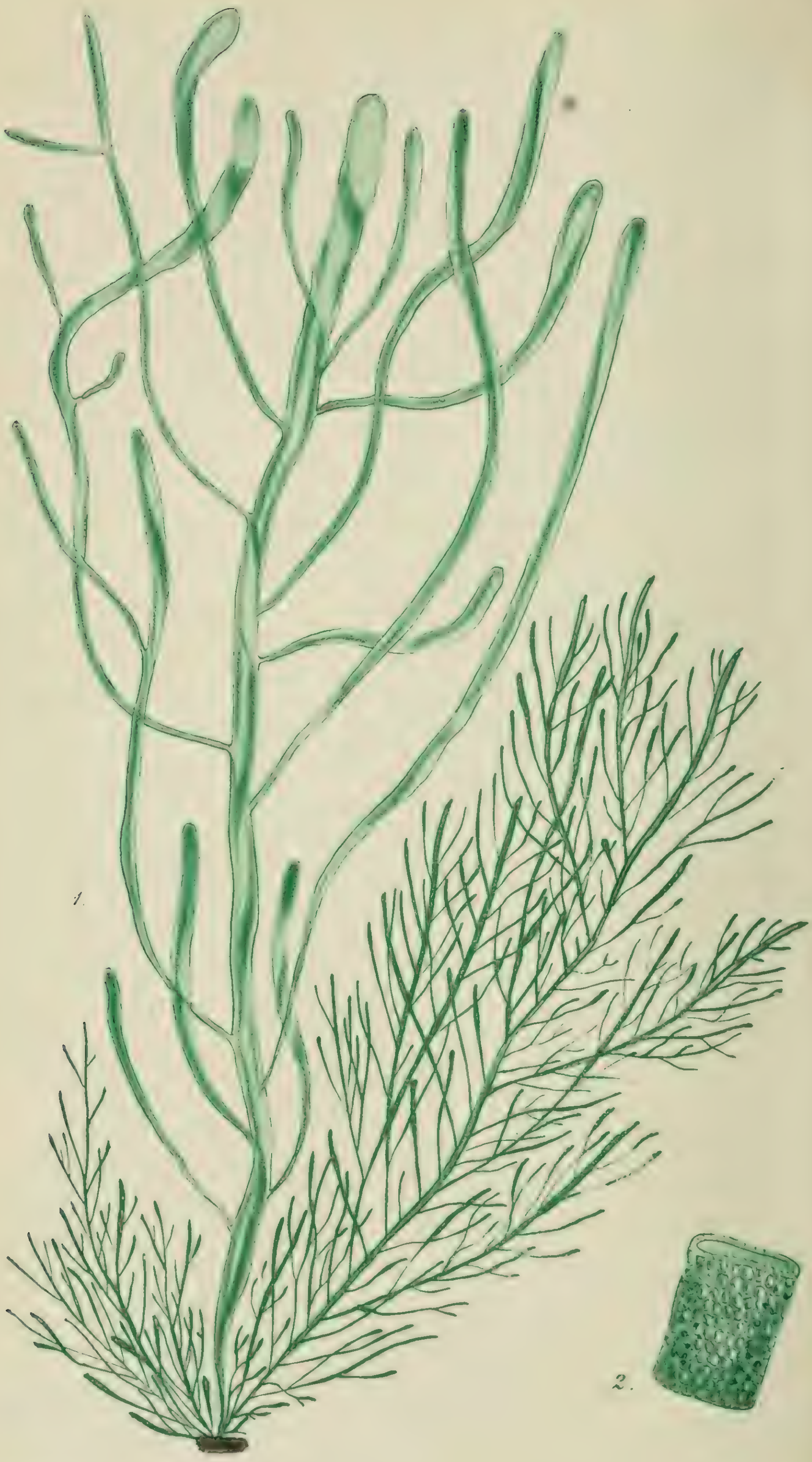

W.H.H. del. et lith. [illegible]

PLATE CCCXXXV.

ENTEROMORPHA COMPRESSA, *Grev.*

GEN. CHAR. *Frond* tubular, membranaceous, of a green colour and reticulated structure. *Fructification,* granules, commonly in fours, contained in the cellules of the frond. ENTEROMORPHA (*Link*),—from *εντερον,* an *entrail,* and *μορφη, form* or *appearance.*

ENTEROMORPHA *compressa*; fronds elongated, branched, cylindrical, or subcompressed; the branches simple, or nearly so, long, obtuse, much attenuated at the base.

ENTEROMORPHA compressa, *Grev. Alg. Brit.* p. 180. tab. xviii. *Hook. Br. Fl.* vol. ii. p. 314. *Harv. Man.* ed. 1. p. 174. ed. 2. p. 213. *Harv. in Mack. Fl. Hib.* part 3. p. 242. *Wyatt, Alg. Danm.* No. 165. *Kütz. Sp. Alg.* p. 480.

SOLENIA compressa, *Ag. Syst. Alg.* p. 186.

FISTULARIA compressa, *Grev. Fl. Edin.* p. 300.

ULVA compressa, *Linn. Fl. Suec.* p. 433. *Lightf. Fl. Scot.* vol. ii. p. 969. *Ag. Sp. Alg.* vol. i. p. 420. *Sm. E. Bot.* t. 2739.

ILEA compressa, *Gaill. Dict. Sc. Nat.* vol. iii. p. 373.

SCYTOSIPHON compressus, *Lyngb. Hyd. Dan.* p. 64. t. 15. A. B.

CONFERVA compressa, *Roth, Cat. Bot.* vol. i. p. 161.

HAB. On rocks, stones, and woodwork in the sea between tide-marks, in æstuaries, &c. Annual. Vegetates at all seasons. Excessively common.

GEOGR. DISTR. Generally diffused throughout temperate and tropical latitudes, in both hemispheres.

DESCR. *Root* a small disc. *Fronds* tufted, or clothing wide spaces of rock, from an inch to six or twelve inches long or more, sometimes as fine as hair, sometimes half an inch or more in breadth, extremely variable in aspect and in ramification. The wider specimens are often but slightly branched, having a principal stem furnished with several, irregularly inserted, long and simple lateral branches; the narrower individuals are repeatedly divided; their branches bearing one or more sets of lesser branches; and other varieties have the branches, or the whole plant, clothed on all sides with slender capillary ramuli. All the branches, and their divisions, taper greatly toward the base, and the apices are generally blunt. The tube is more or less strongly compressed in most cases, but some of the wider varieties are inflated, in which case they can only be known from *E. intestinalis* by being branched. The colour is a beautifully brilliant green, and the surface glossy as silk. The substance is membranous, and adheres but imperfectly to paper.

This plant is dispersed almost over the whole explored ocean, having been brought from nearly every shore, except those few antarctic coasts where nothing marine vegetates, save *Diatomaceæ*. I have never seen a collection of Algæ, of any extent, from any part of the world, which did not contain specimens of *Enteromorpha compressa*. Though always recognizable by the character of its branches tapering toward the base, it puts on a multitude of aspects according to the situation in which it grows. Near high-water mark it forms a short, shaggy pile, of slender fronds, spreading over rocks and stones, and most treacherous to the stepping of unwary feet, being pre-eminently slippery. A little lower down, in the rock-pools, it has the appearance of the varieties figured in our plate; and where fresh-water streams flow into the sea, it becomes broader, with inflated tubes, and often of great length. Such forms closely resemble *E. intestinalis*, which, however, is never branched. Other varieties occur on floating timber, on piles exposed to the tide, and on the vertical walls of quays in tidal rivers; in fact, in nine cases out of ten, when such objects are seen clad in green, the appearance is caused by the presence of this species.

Fig. 1. Sundry varieties of ENTEROMORPHA COMPRESSA:—*of the natural size.*
2. A small portion of a branch magnified, to show the cellular structure.

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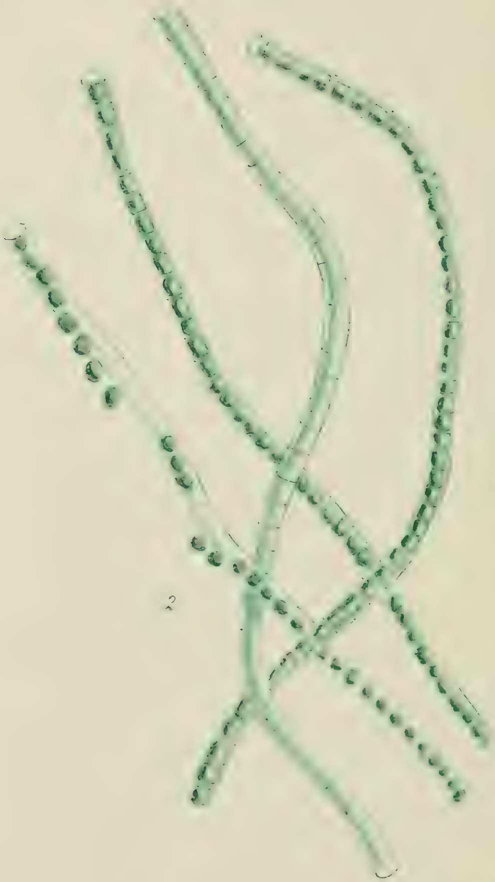

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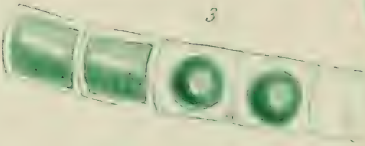

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W.H.H. del et lith.

PLATE CCCXXXVI.

LYNGBYA (HORMOTRICHUM) CUTLERIÆ, n. sp.

GEN. CHAR. *Filaments* destitute of a mucous layer, free, flexible, elongated, decumbent, not oscillating. *Tube* continuous; endochrome green or purple, densely annulated, and finally separating into lenticular sporidia. LYNGBYA (*Ag.*),—in honour of *H. C. Lyngbye,* author of an excellent work on the Algæ of Denmark.

LYNGBYA *Cutleriæ*; filaments excessively slender, soft, articulated; articulations about as long as broad, the endochrome at length formed into a spherical sporidium.

HAB. In æstuaries. Annual. Spring and summer. Near the mouth of the Otter, Budleigh Salterton, covered every tide, *Miss Cutler* (May 1850).

GEOGR. DISTR.

DESCR. *Filaments* forming continuous tufts, excessively slender and delicate (like those of *Conferva bombycina*), soft, curved, but not twisted, articulated throughout. In an early stage the filament is confervoid, the cells, which are about as long as, or a little longer than broad, being filled with a pale green fluid endochrome. At a later period this gradually becomes granular and contracts, no longer filling the tube, and finally it is consolidated into a brilliant bead-like green sporidium. Soon afterwards, the membrane bursts, the filaments break up, and the mature fruit is dispersed in the water. *Substance* somewhat gelatinous, the plant adhering most closely to paper in drying.

I am indebted to Miss Cutler, of Budleigh Salterton, for a specimen of the pretty little plant here figured. It has all the generic characters of Kützing's genus *Hormotrichum,* which has been already placed provisionally as a subgenus of *Lyngbya,* but it does not appear to accord specifically with any of the species described by Kützing. Believing myself, therefore, at liberty to assign a specific name to it, I wish to dedicate our new species to its discoverer, who has greatly enriched the British marine flora with discoveries and observations, and to whom Dr. Greville has already inscribed the genus *Cutleria*.

Fig. 1. LYNGBYA (HORMOTRICHUM) CUTLERIÆ :—*the natural size.* 2. Portions of filaments of various ages :—*magnified.* 3. A small portion of a partly mature filament; and 4, a sporidium :—*both very highly magnified.*

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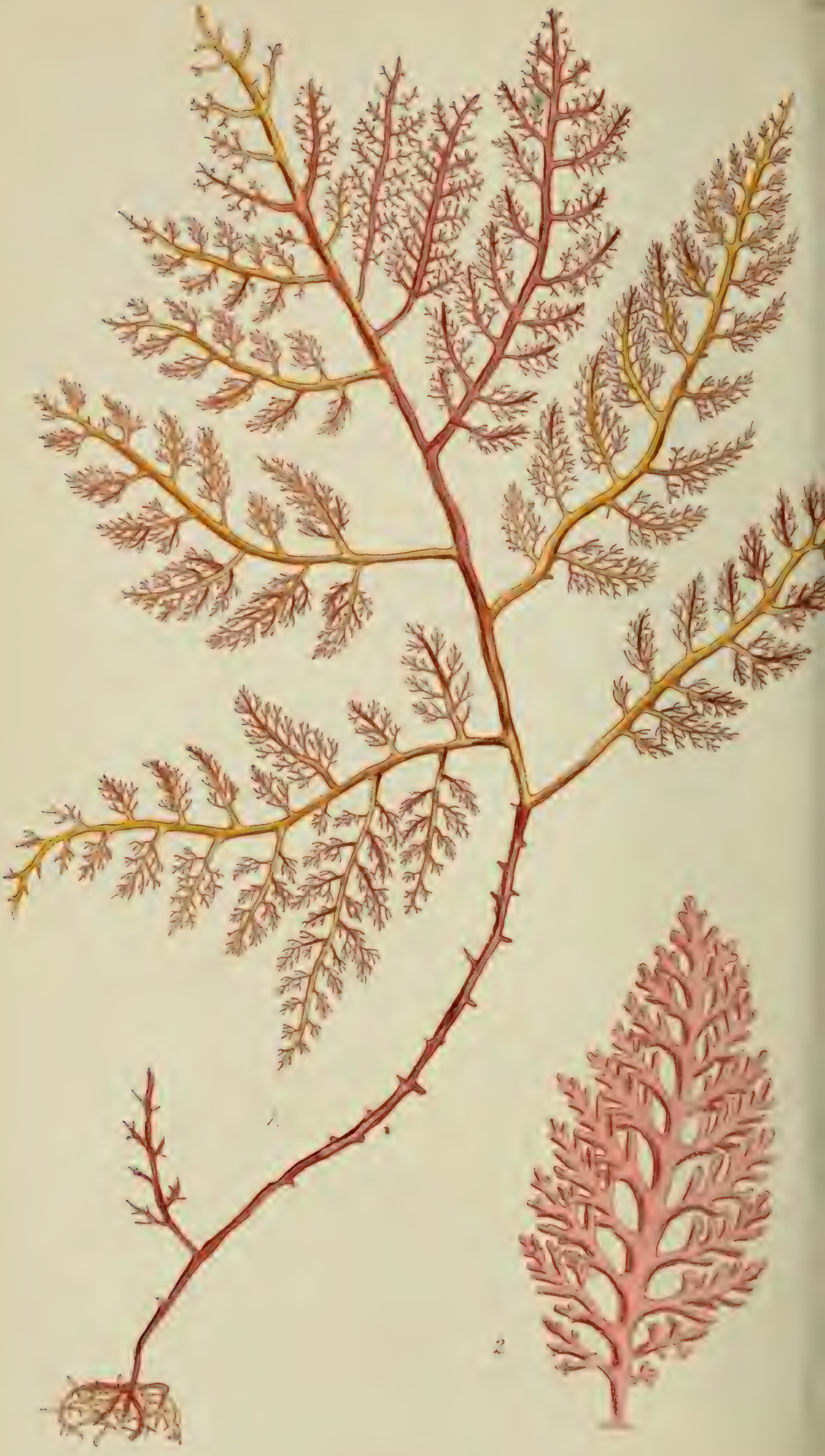
Plate CCCXXI



W. H. H. del et lith.

PLATE CCCXXXVII.

GELIDIUM CARTILAGINEUM, *Gaill.*

GEN. CHAR. *Frond* linear, compressed, pinnated; its *axis* composed of densely interwoven, longitudinal, tenacious fibres; the periphery of small, polygonal cells. *Fructification* of two kinds, on distinct individuals: 1, *tubercles* (*favellidia*) immersed in swollen ramuli, containing a spherical mass of oblong spores; 2, *tetraspores* contained in club-shaped ramuli, bipartite or tripartite. GELIDIUM (*Lam.*),—from *gelu*, frost, whence also *gelatine*; but none of the species of the restricted genus are gelatinous.

GELIDIUM *cartilagineum*; frond several times pinnated, pinnæ and pinnulæ alternate, erecto-patent, with rounded axils, linear, obtuse; tubercles elliptical, mucronate, immersed in the ultimate pinnules.

GELIDIUM cartilagineum, *Gaill. Résum.* p. 15. *Duby, Bot. Gall.* p. 948. *Grev. Alg. Brit.* p. 140. *Hook. Br. Fl.* vol. ii. p. 304. *Harv. Man.* ed. 1. p. 81. ed. 2. p. 139. *Kütz. Phyc. Gen.* p. 406. t. 73 (*Anatomy*). *Sp. Alg.* p. 763.

GELIDIUM concatenatum, *Lamour. Ess.* p. 41.

GELIDIUM versicolor, *Lamour. Ess.* p. 41.

SPHÆROCOCCUS cartilagineus, *Ag. Sp. Alg.* vol. i. p. 286. *Ag. Syst.* p. 227.

FUCUS cartilagineus, *Linn. Sp. Pl.* p. 1630. *Gun. Fl. Norv.* p. 108. t. 3. f. 5. *Esper, Ic. Fuc.* t. 1. *Turn. Syn.* vol. ii. p. 284. *Turn. Hist.* t. 124. *E. Bot.* t. 1477.

FUCUS capensis, *Gm. Hist. Fuc.* p. 157. t. 17. f. 1.

FUCUS versicolor, *Gm. l. c.* p. 158. t. 17. f. 2.

HAB. Thrown ashore, occasionally, on the south coasts of England. Perennial. Freshwater Bay, Isle of Wight, *Dr. Withering* (*Turn. Syn. l. c.*) Picked up at Ryde, Isle of Wight, in 1849, by *Mr. Sheppard* (*Miss Gifford,* in litt.)

GEOGR. DISTR. Cape of Good Hope, and Port Natal; abundant. California. Canary Islands. Chinese Sea. (Adriatic, *Wulfen.* Near Nice, *Allioni.* Northern Ocean, as by Finmark, here and there, *Gunner*:—*fide Turn. Hist.* vol. ii. p. 138.)

DESCR. *Root* fibrous, matted, extensively spreading. *Fronds* tufted, from one to two feet in length, linear, compressed, scarcely a line in breadth; *stem* undivided or once or twice forked, usually naked below, set in the upper half with decompoundly pinnated spreading branches. *Branches* three or four times pinnate, ovate in outline, the lowermost pinnæ being longest and most compound, the upper more simple, and the ultimate ones frequently quite simple and spine-like, in which case the apex of the branch runs out in a long acumination. *Pinnæ* and *pinnulæ* linear, obtuse, inserted at wide angles or somewhat horizontal, but the apices usually curved inwards, so as to make the general direction of the ramulus erecto-patent. *Substance* cartilaginous, tough. *Colour*, when quite recent, a very dark brown-red or purplish-red, but after exposure passing through scarlet, orange, yellow, and light green, to white.

~~~

This fine species was first introduced to the British Flora by Mr. Turner, in his *Synopsis* (1802), on the authority of specimens collected by Dr. Withering; but in the *Historia Fucorum* (1809) its British habitat is, as Dr. Greville observes, altogether omitted, and it is not alluded to in any way as a British plant. In English Botany it is retained on the authority of Dr. Withering's specimens, which are said to have been collected a short time before that author's death. The *Fucus cartilagineus* of his work (vol. iv. p. 119) has no reference to these specimens, but is merely copied from Hudson (Fl. Ang. 586), whose synonym is commonly referred to *Sphærococcus coronopifolius*.

I am indebted to Miss Gifford for a specimen, from which the figure now given has been prepared, and which forms a part of a tuft of fronds picked up on the shore near Ryde, by Mr. Sheppard. I do not, however, consider the claims of this plant to be regarded as British at all increased by the discovery of these specimens, which were probably thrown overboard from some ship at Spithead, and wafted ashore. They have all the appearance of being Cape-grown: in size and colour, and whole aspect, they are identical with the usual specimens brought by sailors from that coast. Were the plant of British growth we should expect to find some characteristic mark, or, at least, that it would be thrown up from the sea in an unbleached state. From the geographical range of this plant, it is highly improbable that it should be a native of our shores. The nearest point to our shores of any of its well-ascertained habitats, is at the Canary Islands; the Mediterranean habitats being very uncertain, and that in Finland evidently a mistake.

Fig. 1. GELIDIUM CARTILAGINEUM:—*the natural size.* 2. One of the pinnæ:—*slightly magnified.*
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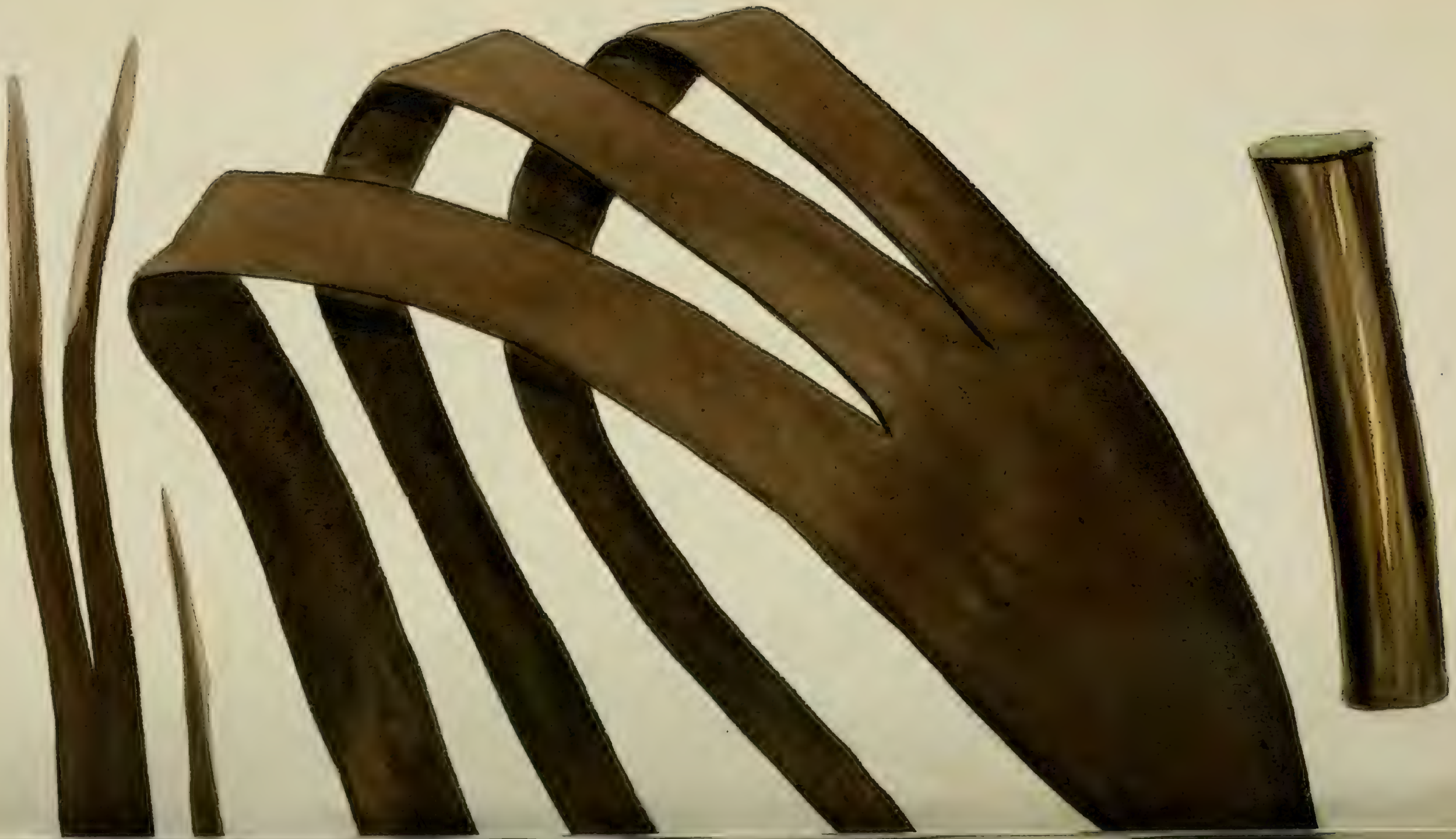

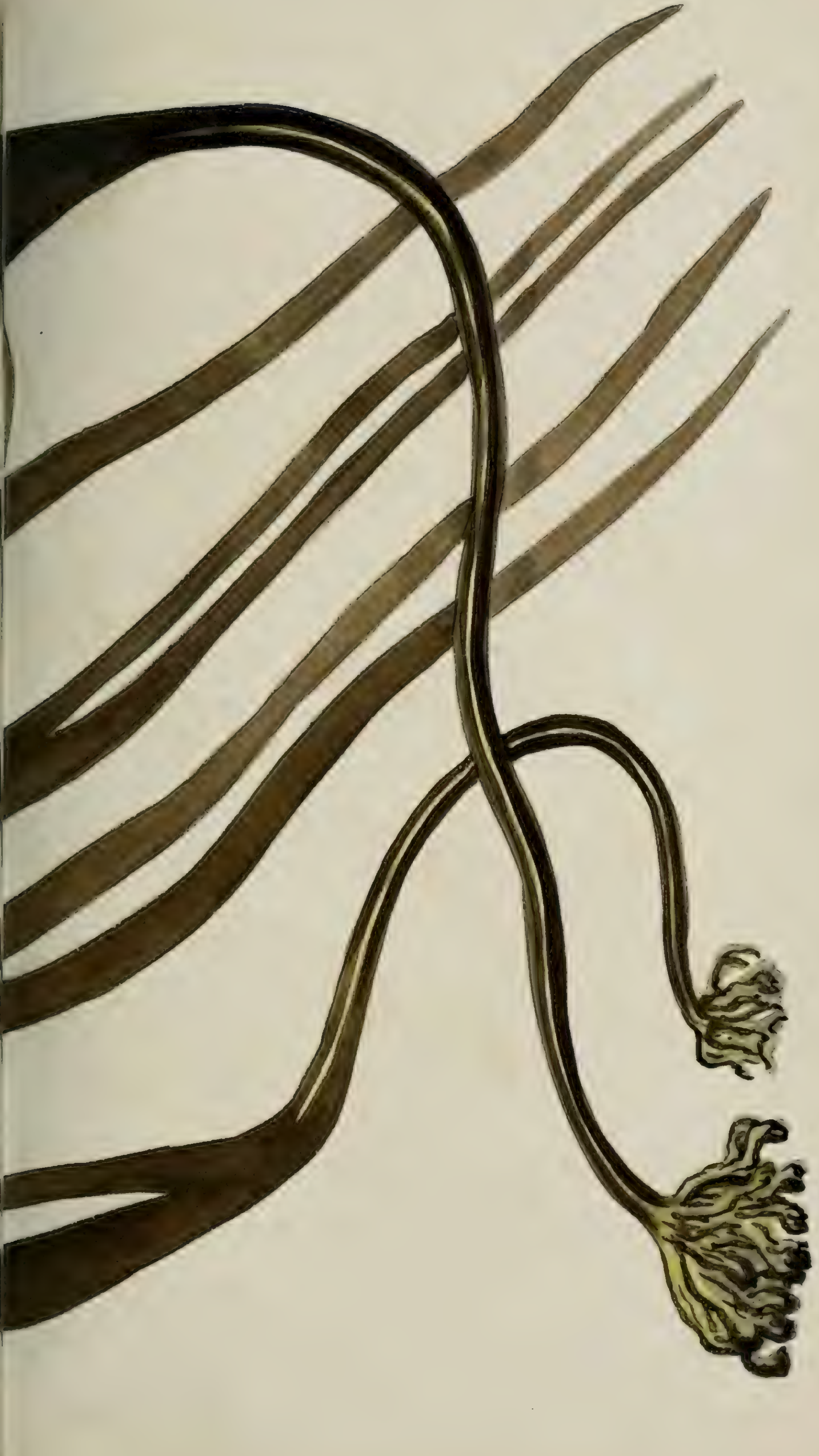

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PLATE CCCXXXVIII.

LAMINARIA DIGITATA,

Var. STENOPHYLLA.

LAMINARIA *digitata stenophylla*; whole plant dark brown; stipes slender, flaccid, glossy, becoming compressed or flattened upwards; lamina wedge-shaped and tapering at base, much longer than the stipe, digitate, its segments few, and very narrow.

HAFGYGIA digitata, var. stenophylla, *Kütz. Sp. Alg.* p. 577.

LAMINARIA conica, *Bory, Dict. Cl. d'Hist. Nat.* vol. ix. p. 190.

HAB. Common round the shores of the Orkney Islands, and the North of Ireland.

On Plate CCXXIII. I have figured a small specimen of the ordinary form of *L. digitata,* and given a detailed description of the species; and I here figure an equally small specimen of what is either a remarkable variety of that species or entitled to specific distinction. My attention was first drawn to it by my friend the *Rev. J. H. Pollexfen,* who directed me to some excellent remarks on these *Laminariæ,* furnished by Rev. C. Clouston, of Orkney, to 'Anderson's Guide to the Highlands and Islands of Scotland.'

The differences between these varieties are so marked, that the Orkney kelp-men have assigned peculiar local names to each, calling the ordinary *L. digitata* (Plate CCXXIII.) *Cuvy,* and the form here figured *Tangle.* I extract the following contrasted characters of each from Mr. Clouston's memoir:—

> "*Root.* The fibres of the root of the *Cuvy* (*L. digitata vera*) are arranged in longitudinal lines or rows, not whorls; while the fibres of the *Tangle* (*L. d. stenophylla*) have no order at all. This arrangement of the fibres is particularly evident, as the plant is frequently thrown on shore, having all except the stumps worn away by friction.
>
> "*Stipes.* The *stipes* of the Cuvy scarcely ever exceeds four or five feet in length, while its circumference near the root is sometimes seven inches. It is so stiff as to stand up almost perpendicular two-thirds of its height; but droops at the top from the weight of the frond. It is surrounded by a *rough* bark as thick as pasteboard, which may be separated from it. *Colour* light brown; much infested with parasitical plants, particularly the *Ptilota plumosa* and *R. palmata,* or Dulse. It tapers much towards the top, but retains its *round* figure till it spreads immediately into the frond. The lower end tastes very *salt,* and is *not eatable.* The *stipes* of the Tangle, on the contrary, frequently attains the length

of eight or ten feet, while its circumference seldom exceeds four inches. It is so *flexible* as to lie prostrate on the rocks; has a *smooth* polished surface, and no bark that can be separated, at least easily; *colour* very dark brown or black; rarely hurt by any parasitical plant: the top is considerably *flattened* some time before it expands into the frond, and the lower end tastes *sweet*, and is much eaten by some people.

"*Frond.* The frond of the Cuvy is *thicker*, *shorter*, and the segments more numerous and *clustered*, than in the Tangle. That of the Cuvy swells into blisters by steeping in fresh water, while the frond of the Tangle bleaches white; but the great distinction in this part, and the one which makes this plant so valuable, is, that the Cuvy annually *throws off the old leaf*, and acquires a new one, while this has never been observed in the Tangle." [Here follows an account of the shedding of the old fronds; the history then proceeds.] "The situations in which the two plants grow are also very different; the Cuvy growing so far out in the sea that the highest limit can only be approached at the lowest stream tides, and from this it runs into the ocean, as far as the eye can penetrate, and probably much farther; while the Tangle may be approached at ordinary tides, and forms a belt between the Cuvy and the beach. The general aspect also differs. The stems of the Cuvy stand up like a parcel of sticks, and the leaves wave from them like little flags; while the Tangles lie prostrate on the rocks, the leaves mingle together, and form a darker belt round the shore. Six or eight feet is reckoned a good length for a Cuvy, while Tangles may be found from twelve to twenty feet."—*Anderson's Guide*, ed. 1. p. 721, 722.

I can bear witness to the accuracy of most of the above observations, having had, last summer, an opportunity of seeing, in the neighbourhood of the Giants' Causeway, both plants growing in profusion, and each retaining its peculiarities. The *Tangle* is strikingly obvious, from its dark colour, on the white limestone-rocks near Dunluce Castle, where it forms a clearly defined fringe round the bases of the cliffs. I have traced it from a few inches to many feet in length, and found it retain its form, and colour, and glossy, flaccid stipe; and so far as my opportunities of judging allow me to form an opinion, I am disposed to regard it as a *good species*. But perhaps a more careful observation, and comparison, may be necessary before this be definitively settled, and for the present I leave it as a form of *L. digitata*; recommending the varieties of that species, on all parts of the coast, to the study of observers. In drying the colour becomes olive.

In Mr. Edmondston's 'Flora of Shetland' (p. 54), the trivial name *digitata* is applied to the plant here figured; while the ordinary *L. digitata* (or Cuvy) is called *L. Cloustoni*, Edm.

Tab. CCCXXXVIII. A very young, and a more advanced specimen of *L. d. stenophylla*. Fig. 1. Small portion of a full-grown, compressed stipes:—all the figures *the natural size.*

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Plate CCCXXXIX.

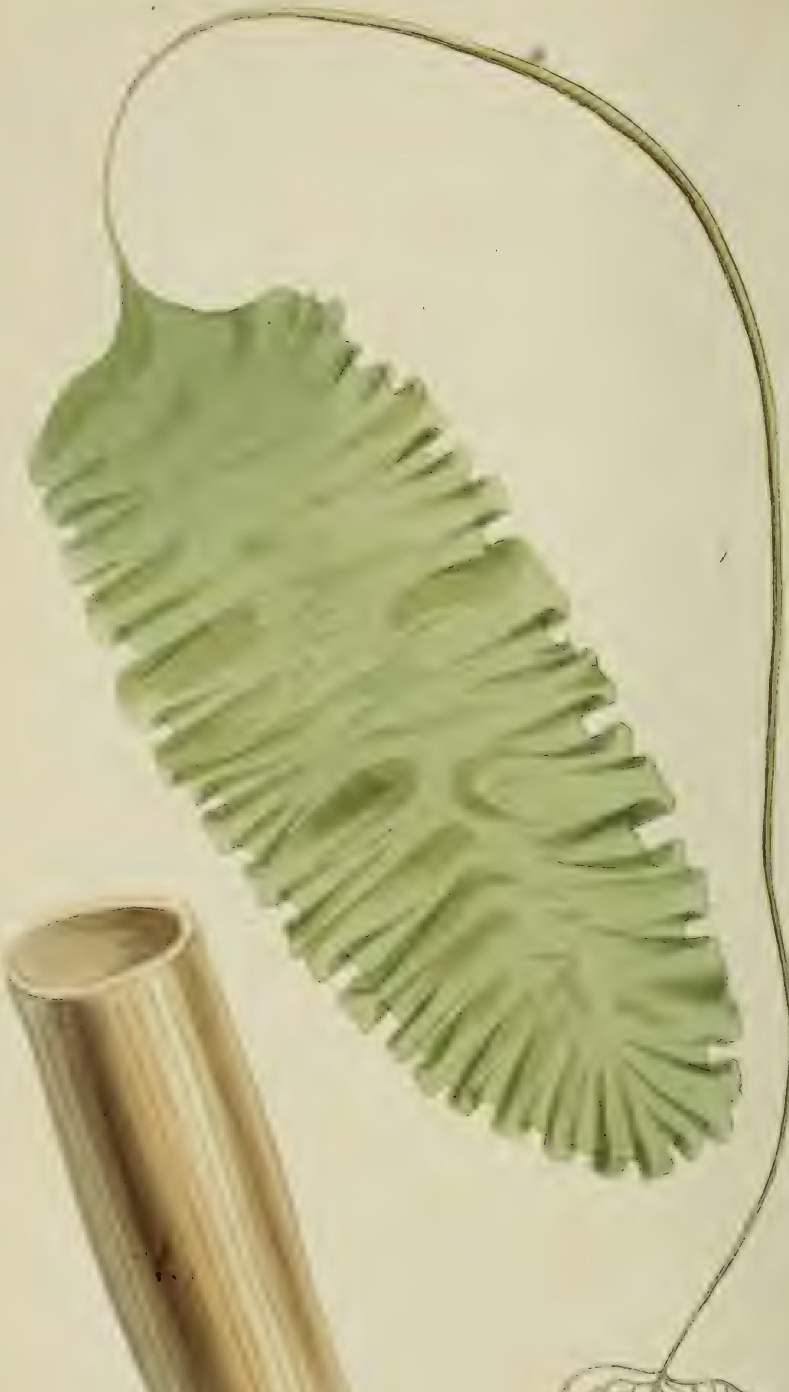

PLATE CCCXXXIX.

LAMINARIA LONGICRURIS, *De la Pyl.*

GEN. CHAR. *Frond* stipitate, coriaceous or membranaceous, flat, undivided or irregularly cleft, ribless. *Fructification,* cloudy spots of spores, imbedded in the thickened surface of some part of the frond. LAMINARIA (*Lamour.*),—from *lamina,* a thin plate, in allusion to the flat frond.

LAMINARIA *longicruris;* stipes very long, slender at the base, hollow and inflated in the middle, and gradually tapering to the apex; frond undivided, ovato-lanceolate, membranaceous, obtuse.

LAMINARIA longicruris, *De la Pyl. An. Sc. Nat.* vol. iv. p. 177. t. 9. f. A. *Fl. Ter. Neuv.* p. 41. *Post. & Ruppr. Illustr.* p. 10. *J. Ag. Sp. Alg.* vol. i. p. 135. *Kütz. Sp. Alg.* p. 576. *Harv. Ner. Bor. Amer.* t. 6.

LAMINARIA ophiura, *Bory, Dict. Class.* vol. ix. p. 198.

HAB. Cast ashore. Island of Sanday, Orkney, *Mr. George Firth* (1838), fide *Rev. J. H. Pollexfen.* Coast at Gamnie, Banffshire, *Rev. G. Harris* (May 1850), fide *Prof. Dickie.* Ayrshire coast, *Rev. D. Landsborough* (July 1850). Near Dunluce Castle, county Antrim, *W. H. H.* (August 1850):—all the specimens much worn, and covered with barnacles.

GEOGR. DISTR. Northern Ocean, at Spitzbergen, *Vahl.* Baltic Sea, *J. Agardh.* Newfoundland (*De la Pylaie*), and common along the American shore as far south as Cape Cod, *W. H. H.* Bahama Islands, *Chauvin.* Kamtschatka, *Postells and Rupprecht.*

DESCR. *Root* of numerous, slender, and much branched clasping fibres, issuing at irregular intervals from the lower part of the stipe. *Stem* from eight to twelve feet in length, very slender at the base, and there solid, gradually widening upwards and soon becoming hollow; at length, toward the middle widened to upwards of an inch in diameter, thence tapering to the apex, and terminating in the broadly cuneate base of the lamina. *Lamina,* when full grown, six to eight feet in length and from two to three feet in width, oblong-lanceolate or oval, very much waved at the margins and obtuse at the apex, of thinner substance than in *L. saccharina. Colour* of the stem yellowish-brown, of the lamina a beautiful pale greenish-olive.

This is a very distinct and beautiful species, and one of the largest of the genus, the frond being frequently as large as a moderately-sized table-cloth. It abounds along the coast of

North America, as far south as Boston Bay, and is of particularly large dimensions, and in great abundance, in the deep harbour of Halifax. It would seem also, from its other recorded habitats, to be generally dispersed through the Arctic Sea. But what are its claims to a place in the British flora? At present they are extremely doubtful—all the specimens which have been found being merely the stipes, covered with barnacles, and deprived of both root and leaf. The *hollow* stipe, tapering to both ends, is, however, so remarkable that no mistake can be made in identifying the specimens. The question simply is, *where* were these specimens grown? By their colony of barnacles they must have been long adrift, and most probably they were wafted either from the shores of Greenland or the more distant American coasts, swept by the Gulf Stream. To us, therefore, they come with no better claim on our charity than the equally drifted fronds of *Sargassum*. But I am not without hope that future observations, in the bays of Shetland or Orkney, may establish a clearer title; for if *L. longicruris* be truly a native of the Baltic, as Agardh assures us, there is nothing improbable in its vegetating in our most northern bays. In general aspect it resembles *L. saccharina*, but the frond is proportionally broader and more blunt, and of thinner substance; while the very long stem, hollow and somewhat swollen in the middle, will always afford a clear mark of distinction. Our figure is taken from a specimen collected at Halifax, Nova Scotia.

Fig. 1. Laminaria longicruris:—*on a reduced scale, of an inch to a foot.*
2. A portion of the hollow stem:—*the natural size.*

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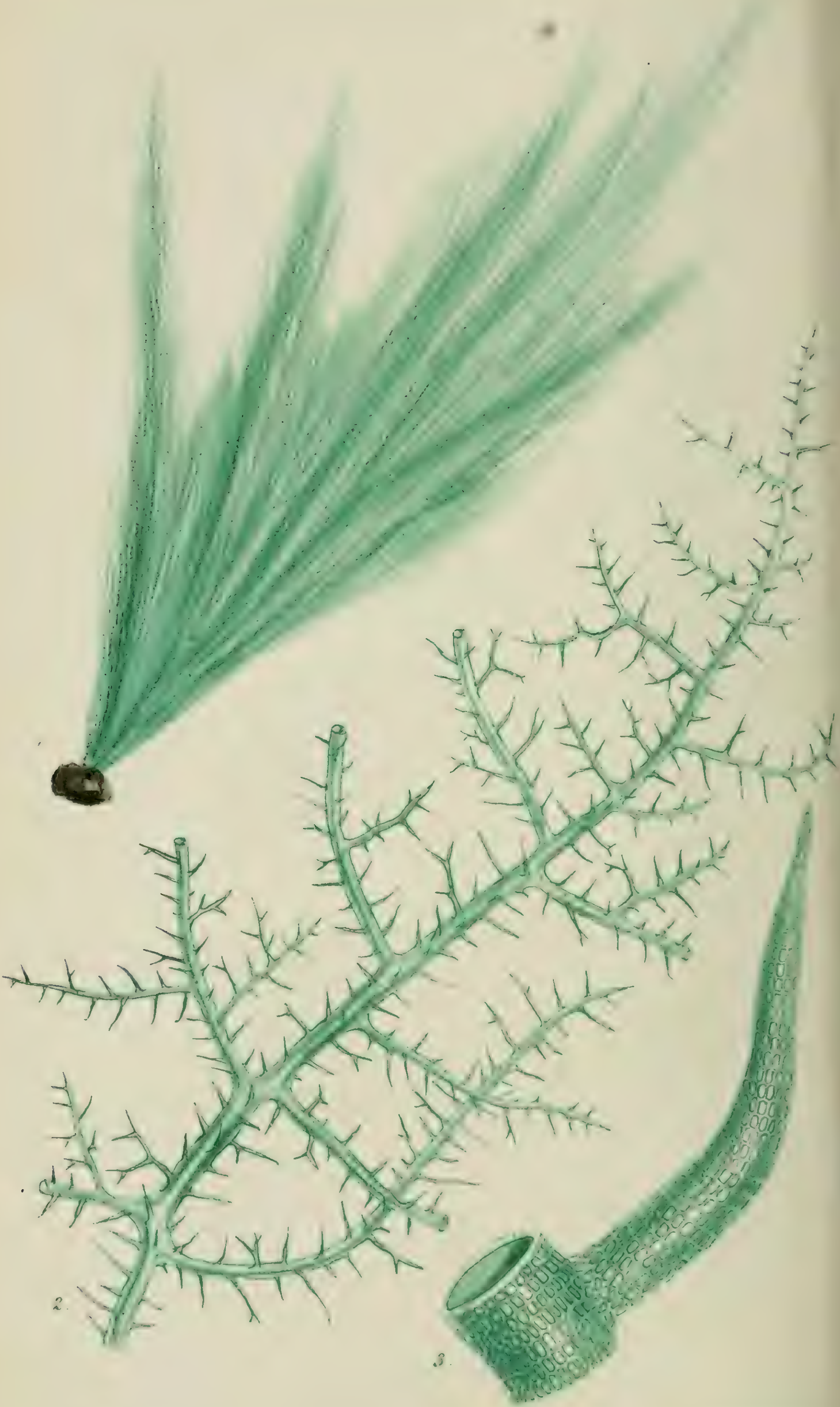
Plate CCCXL.



W. H. H. del et lith.

Reeve & Nichols, imp

PLATE CCCXL.

ENTEROMORPHA CLATHRATA, *Grev.*

GEN. CHAR. *Frond* tubular, membranaceous, of a green colour and reticulated structure. *Fructification,* granules, commonly in fours, contained in the cells of the frond. ENTEROMORPHA (*Link*),—from εντερον, an *entrail,* and μορφη, *form* or *appearance.*

ENTEROMORPHA *clathrata*; frond cylindrical, filiform, slender, highly reticulated; branches spreading, much divided, set with divaricated or recurved, slender, spine-like ramuli.

ENTEROMORPHA clathrata, *Grev. Alg. Brit.* p. 181 (in part). *Hook. Brit. Fl.* vol. ii. p. 315. *Wyatt, Alg. Danm.* No. 34. *Harv. Man.* ed. 1. p. 175. ed. 2. p. 214. *Kütz. Sp. Alg.* p. 479.

SOLENIA clathrata, *Ag. Syst. Alg.* p. 186.

SCYTOSIPHON clathratus, *Lyngb. Hyd. Dan.* p. 66. t. 16.

SCYTOSIPHON paradoxus, *Fl. Dan.* t. 1595. f. 2.

ULVA clathrata, *Ag. Syn.* p. 46.

CONFERVA clathrata, *Roth, Cat. Bot.* vol. iii. p. 175.

CONFERVA paradoxa, *Dillw. Conf.* p. 70. t. F. *E. Bot.* t. 2328.

HAB. In rock-pools, between tide-marks. Annual. Spring and Summer. Not uncommon.

GEOGR. DISTR. Shores of Europe.

DESCR. *Root* a small disc. *Fronds* densely tufted, often inextricably tangled together at the base, from six to eight inches long or more, varying in diameter from the fineness of human hair to that of stout bristles, excessively and irregularly branched; the branches issuing at all sides, of very unequal lengths, patent, and attenuated at the apex, ending in a fine point. The principal branches are furnished with a varying number of lesser divisions, and all are more or less copiously beset with short, slender, awl-shaped, simple or forked, spine-like ramuli, which stand out nearly horizontally from the branches. *Reticulations* of the membrane of large size, and somewhat quadrate. *Colour* of a fine, clear grass-green, becoming paler when dried. *Substance* soft and flaccid, membranous. In drying the plant adheres pretty firmly to paper.

This is nearly related to *E. ramulosa,* but is of a much softer substance, usually more slender in its tube, and more repeatedly branched, so that its tufts are more bushy and feathery. It frequently lies prostrate, forming a widely spreading fleecy covering either to rocks or to mud, but this character is not very constant. To *Ent. erecta* (Plate XLIII.) it is also very closely allied, but is of less plumy habit than that species, with less difference in diameter between the main stems and branches and their lesser divisions, and the ramuli are shorter and more squarrose. Still, it must be confessed that there is a greater resemblance between these three species, in microscopic characters, than a *species-maker* would desire; and I remain of the opinion formerly expressed, that no great violence would be done to truth by regarding them all as forms of one Protean species.

Fig. 1. ENTEROMORPHA CLATHRATA;—Tuft *the natural size.* 2. Part of a branch:—*magnified.* 3. One of the ramuli:—*highly magnified.*

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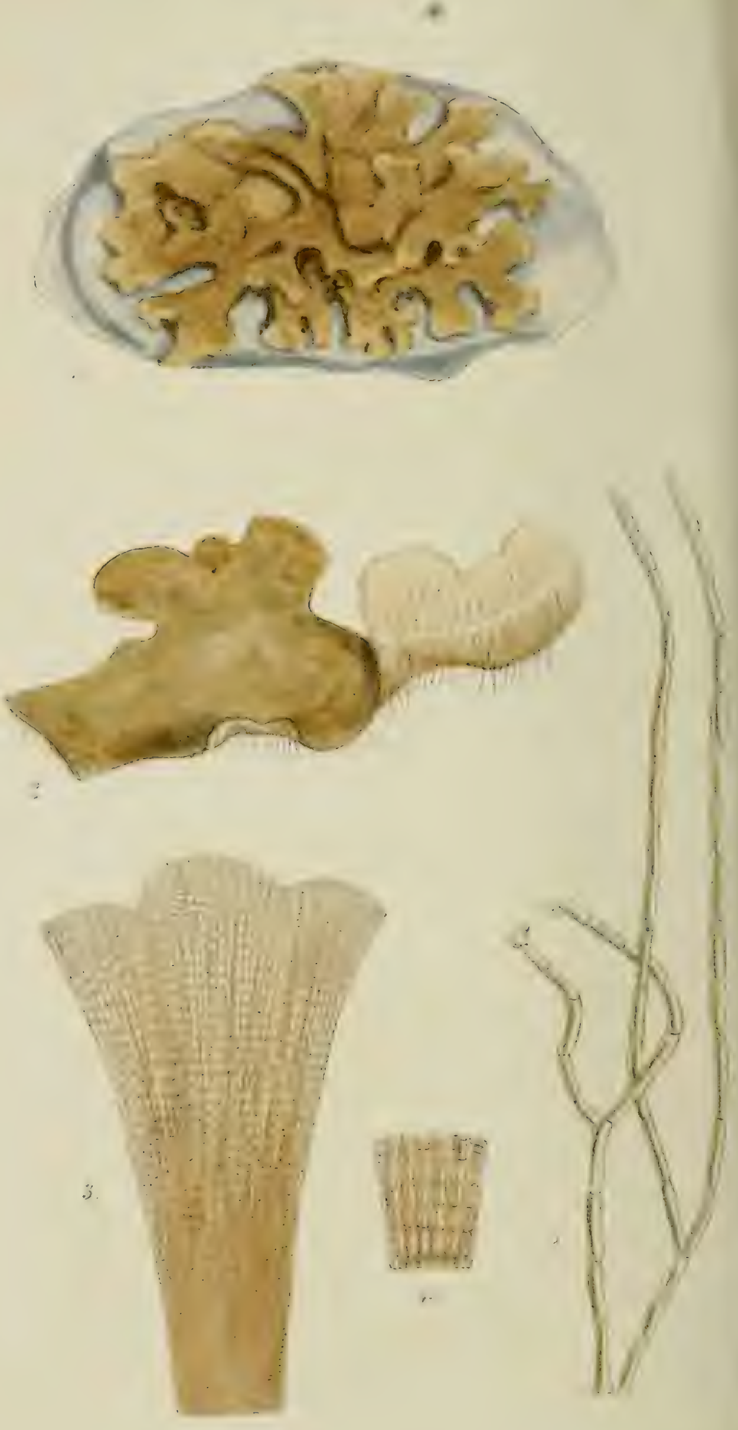
Plate C[illegible]LI



W.H.H. del et lith.

Reeve & Nichols

Plate CCCXLI.

ZONARIA PARVULA, *Grev.*

Gen. Char. *Root* coated with woolly fibres. *Frond* flat, ribless, fan-shaped, entire or variously cleft, marked with concentric lines; the cells of the surface radiating. *Fructification,* roundish or irregular, scattered *sori,* bursting through the cuticle of both surfaces of the frond, consisting, at maturity, of numerous *spores,* nestling among jointed threads. Zonaria (*Ag.*),—from ζωνη, a *girdle* or *zone*; because the frond is usually transversely banded.

Zonaria *parvula*; frond procumbent, attached by fibres issuing from its lower surface, membranaceous, suborbicular, variously lobed; lobes free, rounded, scarcely marked with concentric lines.

Zonaria parvula, *Grev. Crypt. Fl.* t. 360. *J. Ag. Sp. Alg.* vol. i. p. 107. *Harv. Man.* ed. 2. p. 38.

Padina parvula, *Grev. Alg. Brit.* p. 63. *Hook. Br. Fl.* vol. ii. p. 282. *Harv. Man.* ed. 1. p. 31.

Padina reptans, *Crouan.*

Padinella parvula, *Aresch. Pug.* vol. ii. p. 260. t. ix. f. 1–3.

Aglaiozonia parvula, *Zanard. Sag.* p. 38. *Kütz. Sp. Alg.* p. 566.

Aglaiozonia reptans, *Kütz. l. c.*

Hab. On stones and nullipores near low-water mark, and especially on nullipore banks in 4–15 fathoms water. Perennial? Summer. Discovered by *Miss Cutler,* on sandstone tidal rocks near Sidmouth. Miltown Malbay, near low-water mark; and Roundstone, on the nullipore bank, *W. H. H.* Bute, *Rev. D. Landsborough.* Probably all round the coast, in deep water.

Geogr. Distr. British and French Atlantic coasts. Baltic Sea. Adriatic.

Descr. *Root*? *Fronds* procumbent, spreading over the rocks or surface of the nullipore in circular patches, like a *lichen,* closely attached by means of numerous fibrils or rootlets which issue from all parts of the lower surface; when young roundish, and slightly lobed, the lobes rounded; as the plant advances the lobes become elongate, somewhat linear, from a quarter to half an inch in width, simple or subdichotomously divided, with rounded axils; *apices* always rounded, and broader than the inferior portion of the lobe, thus affecting a fan-shaped form. *Margin* somewhat wavy, free from the rock. *Substance* membranaceous, brittle, and not adhering to paper. *Surface* reticulated with small cells, which are arranged in slightly radiating longitudinal lines, the cells at the base of the lobe being small and close-pressed, those above them wider and longer, quadrate and nearly twice as long as broad: again, the apical cells are always short while the frond is in a growing state, as it increases by successive additions to the outer margin. *Fibrils* simple or forked, taking hold of the rock by discs at their tips.

* * *

This is not an uncommon plant on various parts of our coast, though frequently overlooked, owing to its hiding in crevices, or creeping through the much-branched stony nullipores. When occurring on rocks near low-water mark it is broader, less branched, and of paler colour than when dredged from deeper water. I am not able to detect satisfactory characters by which to separate the *Padina reptans* of Crouan, for specimens of which I am indebted to M. Lenormand.

No one, in this country, has met with fructification, which seems only to have been found by Dr. Areschoug, in Sweden. He finds spores collected in undefined largish sori, near the base of the frond.

Fig. 1. Zonaria parvula :—*the natural size.* 2. Part of a frond :—*magnified.* 3. Small portion of a lobe, to show the longitudinal, radiating lines of cells. 4. A small part of the same, with undeveloped apical cells :—*highly magnified.* 5. Fibrils :—*highly magnified.*

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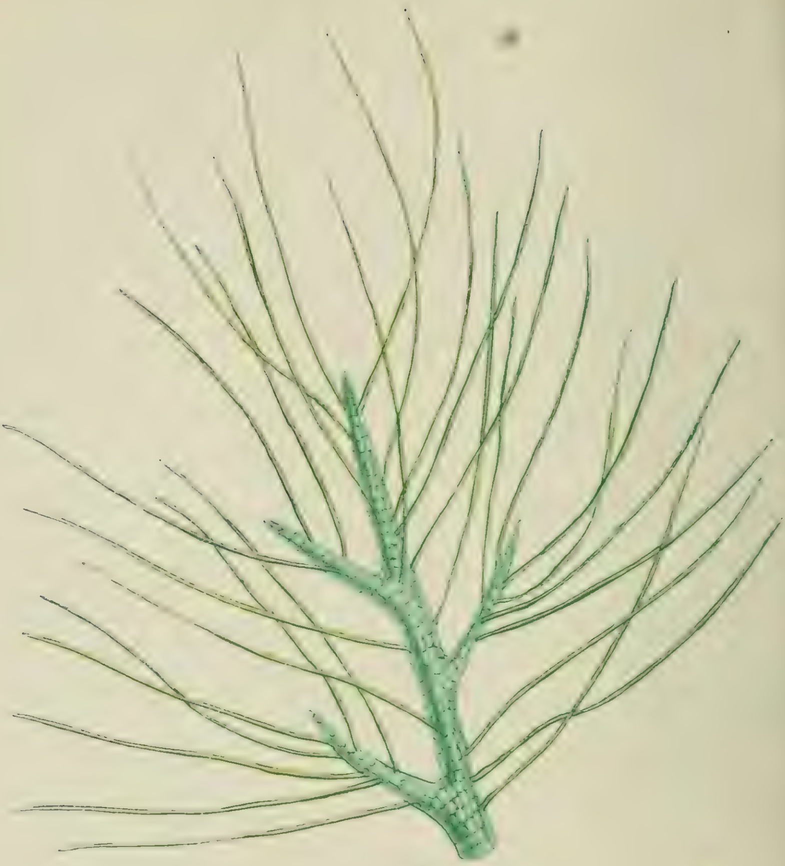

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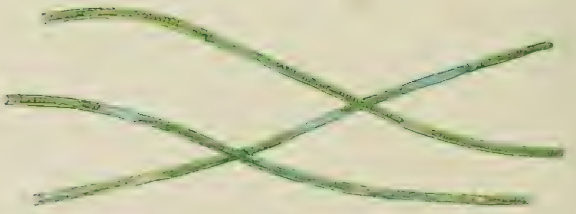

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W.H.H. del. et lith. [illegible]

Plate CCCXLII.

CALOTHRIX LUTEOLA, *Grev.*

Gen. Char. *Filaments* destitute of a mucous layer, erect, tufted or aggregated, fixed at the base, somewhat rigid, not oscillating. *Tube* continuous; endochrome green, densely annulated, at length dissolved into lenticular sporidia. Calothrix (*Ag.*),—from καλος, *beautiful*, and θριξ, a *hair*.

Calothrix *luteola*; filaments scattered, exceedingly minute and slender, filiform, flexible, obtuse, hyaline and pale yellowish, or containing an opake light green, interrupted, faintly annulated endochrome.

Calothrix luteola, *Grev. Crypt. Fl.* t. 299. *Harv. in Hook. Br. Fl.* vol. ii. p. 367. *Harv. Man.* ed. 1. p. 157. ed. 2. p. 224.

Calothrix melaleuca, *Carm. Alg. Appin. MSS.*

Leibleinia luteola, *Kütz. Sp. Alg.* p. 276.

Hab. On marine, filiform Algæ, in tide-pools. Appin, *Capt. Carmichael.*

Geogr. Distr. —— ? Helgoland, *Kütz.*

Descr. *Filaments* of microscopic size, visible to the eye as a minute byssoid coating to small Algæ, when seen under water, but invisible when the affected plant is lifted into the air; scattered, each thread standing apart, of equal diameter throughout, obtuse, very slender, flexible, quite simple, either hyaline and pale yellowish, or more or less filled with an opake, annulated, light-green mass. The whole plant is so minute that it requires the highest powers of a compound microscope to make out its structure.

Our figure has unfortunately been printed in too green an ink, and is less characteristic than I could wish; and will not bear a favourable comparison with the beautiful figure given by Dr. Greville. In one respect, however, I am unable to see this microscopic plant either as Dr. Greville or as Capt. Carmichael has described it, and yet we have all three had the same specimens before us. By Carmichael, its discoverer, it is thus described:—"*Filaments* in small tufts, a line or two in length, exceedingly slender, tortuous, tapering, *of a snow-white colour*, and so *opake* as to appear intensely black when viewed against the light." The *same specimens* are described by Greville thus:— "Filaments *hyaline, yellowish,* exceedingly slender, elongated, flexible, scattered," "neither fasciculate nor tufted." Thus what Carmichael sees *opake* and *snow-white,* Dr. Greville describes as *hyaline* and *yellowish.* If we further contrast the words of the several descriptions, other as striking discrepancies will be seen. So that, had I not received authentic specimens of the original plant, named by Carmichael himself, I should not have hesitated to regard his description as drawn from another species; I can now only attribute the differences to a defective microscope. It should be stated, however, that I have only seen this plant in a dried state, when its colour may have altered from *white* to *green.* Under the higher powers of the microscope the *green* endochrome (of the dried specimen) is very obvious; the "yellow and hyaline" character mentioned by Greville, has reference to the empty tube, from which the colouring matter has been discharged. I have only seen Carmichael's specimen, but as he found it abundantly at Appin, it is probably still to be met with on that coast, and is worth looking after.

Fig. 1. Small fragment of ENTEROMORPHA CLATHRATA, with CALOTHRIX LUTEOLA infesting it:—*the natural size.* 2. The same:—*highly magnified.* 3. Portions of threads of the *Calothrix*:—*more highly magnified.*

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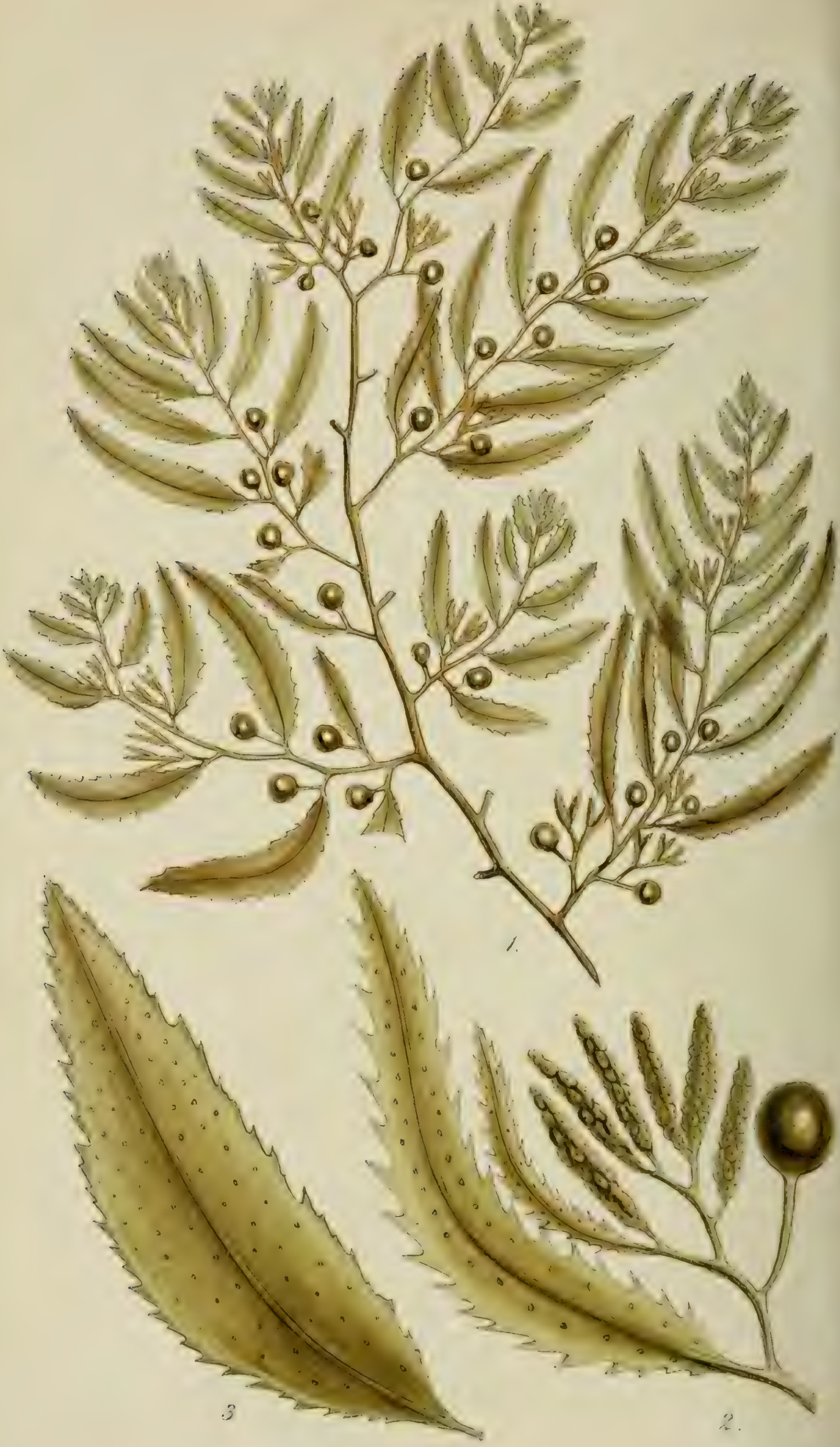

H.H. del et lith
Reeve &

PLATE CCCXLIII.

SARGASSUM VULGARE, *Ag.*

GEN. CHAR. *Frond* furnished with distinct, stalked, nerved leaves, and simple, axillary, stalked air-vessels. *Receptacles* small, linear, tuberculated, mostly in axillary clusters, cellular, pierced by numerous pores, which communicate with immersed, spherical *conceptacles,* containing parietal *spores* and tufted *antheridia.* SARGASSUM (*Rumph.*),—a word formed from the Spanish *sargazo,* the name given by navigators to floating Sea-weed.

SARGASSUM *vulgare*; stem filiform, smooth, alternately branched; leaves linear-lanceolate or oblong-lanceolate (very variable in breadth), serrated, strongly ribbed, copiously glandular; air-vessels on compressed stalks about their own length, spherical, pointless; receptacles axillary, dichotomous, tuberculose, unarmed.

SARGASSUM vulgare, *Ag. Sp. Alg.* vol. i. p. 3. *Ag. Syst.* p. 293. *Grev. Alg. Brit.* p. 2. t. 2. *Hook. Br. Fl.* vol. ii. p. 264. *Harv. Man.* ed. 1. p. 17. ed. 2. p. 15. *J. Ag. Sp. Alg.* p. 342.

FUCUS natans (in part), *Turn. Hist.* t. 46. *Syn.* p. 48. *Sm. Eng. Bot.* t. 2114.

HAB. Cast ashore, drifted by oceanic currents from warmer latitudes. Cast on the shores of the Orkney Isles, *Dr. P. Neill.* (Near Falmouth? *Hudson.*)

GEOGR. DISTR. Atlantic Ocean, abundant on tropical and subtropical coasts. Shores of North America, as far north as Long Island Sound. Coasts of Spain and Portugal.

DESCR. *Root* a conical disc. *Fronds* tufted, from one to three feet in length, having a leading, mostly undivided, stem set throughout with alternate, spreading branches, the lowest of which are longest. *Stem* and branches narrow, filiform or subcompressed, smooth (destitute of rough points), somewhat flexuous. *Leaves* coriaceous, an inch or two in length, from a quarter to half an inch in breadth, oblong or linear-lanceolate, sharply serrated, the surface dotted over with muciferous pores or glands, strongly nerved. *Air-vessels* spherical, about as large as a pea, pointless, borne on compressed stalks about as long as themselves, and springing from the lower part of the petiole of the leaves. *Receptacles* in dichotomous cymoid tufts, springing with the air-vessels from the petioles, cylindrical, tuberculated, usually much shorter than the subtending leaf, sometimes elongated and filiform, and many times forked. *Colour* a foxy olive. *Substance* opake and tough.

One of the stray waifs of tropical climes, which are occasionally brought to our shores by the great north-eastern current of the Atlantic, and which have no proper claim to admission into our Flora. Though the present species has had a place in British works for nearly a century, I have never seen a (so called) British specimen, and have made my figure from an American example.

Fig. 1. Branch of SARGASSUM VULGARE:—*the natural size.* 2. A leaf, with *vesicl* and receptacles. 3. A broader leaf:—*the two last somewhat magnified.*

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Plate CCCLIV

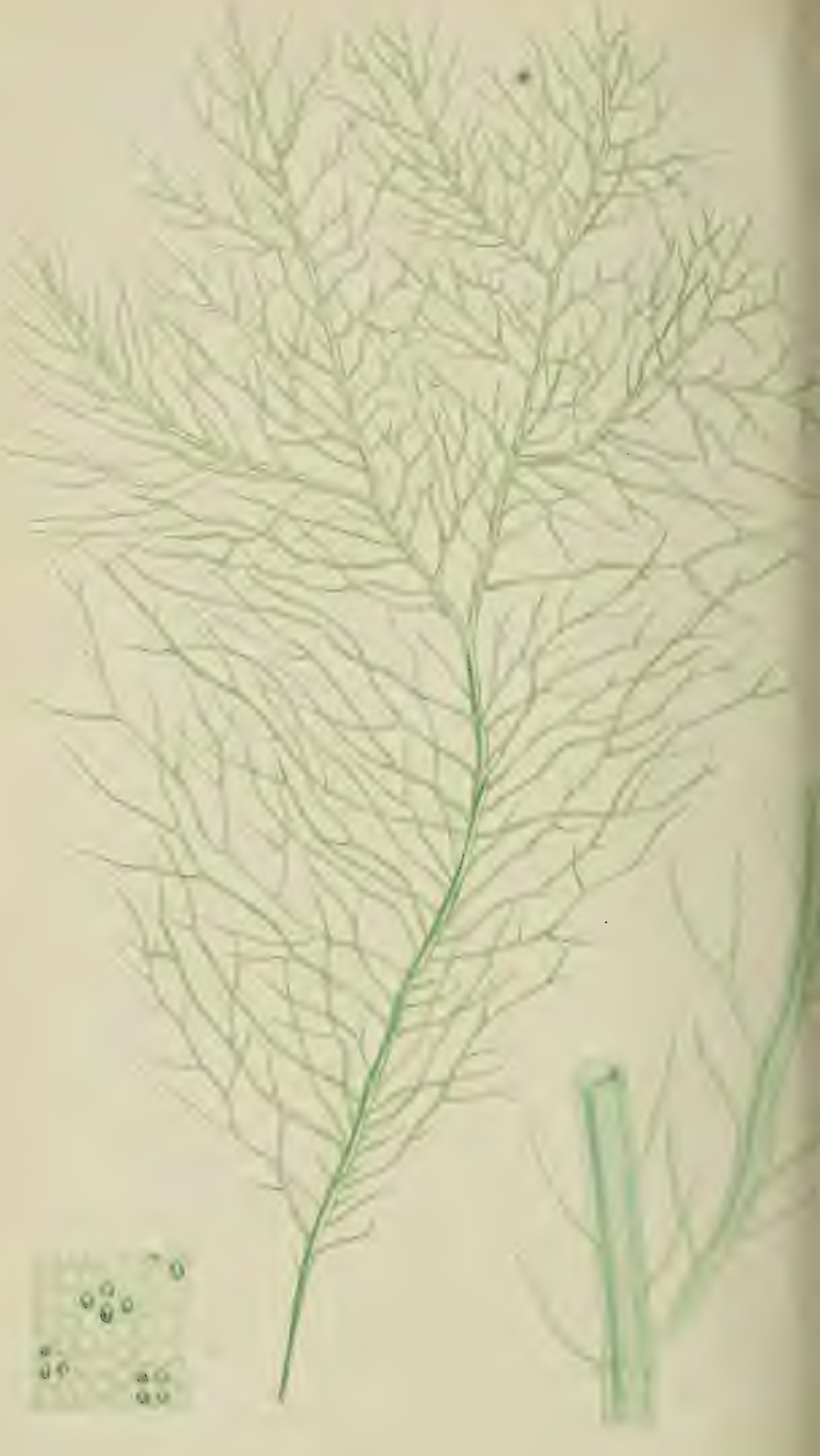

PLATE CCCXLIV.

ENTEROMORPHA LINKIANA, *Grev.*

GEN. CHAR. *Frond* tubular, membranaceous, of a green colour and reticulated structure. *Fructification,* granules, contained in the cells of the membrane. ENTEROMORPHA (*Link*),—from εντερον, an *entrail,* and μορφη, *form* or *appearance.*

ENTEROMORPHA *Linkiana;* "fronds cylindrical, tubular, filiform, reticulated, pellucid, of a very pale green colour, membranaceous (rigid when dry), much branched; branches attenuate."—*Grev.*

ENTEROMORPHA Linkiana, *Grev. Alg. Brit.* p. 182. *Hook. Br. Fl.* vol. ii. p. 314. *Harv. Man.* ed. 1. p. 174. ed. 2. p. 213. *Kütz. Sp. Alg.* p. 481.

HAB. Between tide-marks. Annual. Summer. At Appin, *Captain Carmichael.*

GEOGR. DISTR. —— ?

DESCR. "*Root* a minute disc. *Frond* six to twelve inches in length, filiform, cylindrical, tubular, inflated, rising with a main stem about one line in diameter, on all sides of which, and along the whole length, the branches are inserted; branches two to six inches long, smaller in diameter than the stem, between erect and spreading, set with a second series one or two inches long, which, in their turn, bear a third, which are quite capillary, all of them much attenuated toward the extremity. The *structure* distinctly reticulated, the reticulations roundish, but angular. *Fructification,* three or four subglobose granules within many of the reticulations. *Substance* membranaceous, but firm and somewhat cartilaginous when dry, adhering very imperfectly to paper. *Colour* a very pale, yellowish green."—*Grev. l. c.* (I do not find more than *one* granule in each fertile cell, but three or four fertile cells generally cluster together.)

I prefer copying the above description from Dr. Greville's work, because my knowledge of this species (or form) is limited to a single specimen collected by Capt. Carmichael, and now preserved in the Dublin University Herbarium. From this specimen the figure has been taken. It will be seen that while the external habit is peculiar, the microscopic characters are very similar to those of *E. clathrata, E. erecta,* and *E. ramulosa.* Dr. Greville lays stress on the rigidity of substance, which is very observable in the dry state at least. The branches are of larger diameter than is common in *E. clathrata*, but this is a character of little moment in this genus, and the very pale colour may arise from the peculiar circumstance under which the plant grew :—as, if the specimens were collected in a shallow pool near high-water mark they would assuredly be pale. In such circumstances any species of the genus would be equally bleached.

Fig. 1. Enteromorpha Linkiana :—*the natural size.* 2. Part of a branch and ramuli :—*magnified.* 3. Small fragment of the membrane, with fertile cells :—*highly magnified.*

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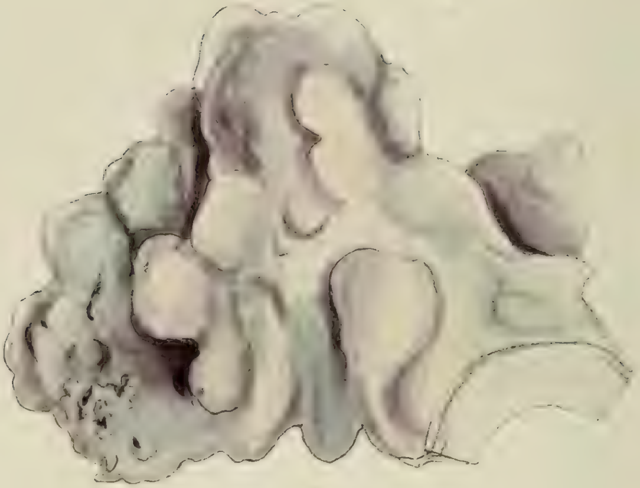

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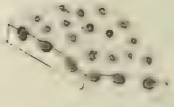

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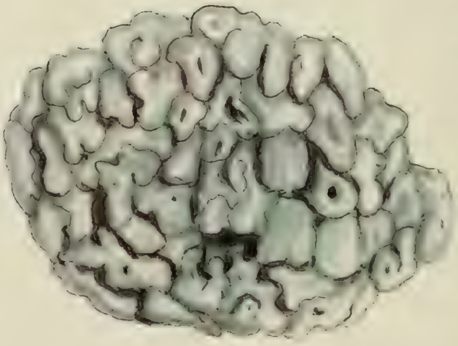

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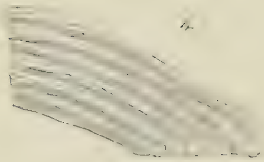

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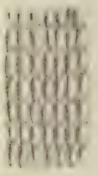

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PLATE CCCXLV.

MELOBESIA POLYMORPHA, *Linn.* (sp.)

GEN. CHAR. *Frond* attached or free, either flattened, orbicular, sinuated or irregularly lobed, or cylindrical and branched (never articulated), coated with a calcareous deposit. *Fructification*: conical, sessile *ceramidia*, scattered over the surface of the frond, and containing a tuft of transversely parted, oblong *tetraspores*.—Named from one of the Sea-nymphs of Hesiod.

MELOBESIA *polymorpha*; frond attached to rocks, thick, stony, encrusting, or rising into short, clumsy branches, which are seldom much divided, and often merely rudimentary; ceramidia minute, depressed, extremely numerous.

MELOBESIA polymorpha, *Harv. Man.* ed. 2. p. 108.

MILLEPORA polymorpha, *Linn. Syst. Nat.* 1285. *Ellis and Soland. Zoop.* 130.

NULLIPORA polymorpha, *Johnst. Brit. Lith.* p. 238. t. 24. f. 1, 2, 3 (?), and t. 25. f. 23. (in part.)

SPONGITES polymorpha, *Kütz. Sp. Alg.* p. 699.

CORALLIUM cretaceum lichenoides, *Ellis, Cor.* p. 76. t. 27. fig. d. D. (*fide fig.*)

HAB. On littoral rocks all round the coast, extending beyond low-water mark. Common.

GEOGR. DISTR. (*Probably widely dispersed.*)

DESCR. *Frond* at first appearing on the surface of rocks, pebbles, or shells, in the form of little stony pimples, which gradually become confluent, so as to form an uneven crust, resembling one of the crustaceous *Lichens*, and spreading over indefinite spaces. This crust gradually grows thicker by successive thin coats of cellular and calcareous substance formed and deposited on the surface, and is very irregular in form; sometimes continuing nearly flat, sometimes rising into irregular stony knobs or lumpy masses, and sometimes throwing up short, erect, scarcely divided branches. *Ceramidia* minute, dot-like, sunk deeply in the outer layer of cells, extremely numerous and often puncturing over the whole surface of fertile fronds as if they had been closely marked with pin-holes. *Colour* variable according to the locality, dark lurid purple near low-water mark, and passing into chalky-white as the specimens grow nearer high-water mark. *Cells* of which the frond is composed about twice as long as their diameter. *Substance* stony.

To this form I refer most of the lumpy *Nullipores*, with thick stony fronds, and of various uncertain shapes, found encrusting tidal rocks, and occasionally thrown up or dredged from deeper water. Dr. Johnston's figures, at Plate XXIV. 1, 2, 3, of his 'History of British Sponges and Lithophytes,' represent a form which abounds in Dalkey Sound, near Dublin, and on which the late Mr. M'Calla founded a species which he called *Nullipora compressa.* It perhaps ought to receive a specific name, but, if left unennobled, it seems to me rather to fall, as a variety, under *M. calcarea,* than under the present species.

Fig. 1 and 2, different specimens of MELOBESIA POLYMORPHA:—*the natural size.* 3. Small portion of a fertile frond, showing the ceramidia. 4. Vertical section of the frond, to show arrangement of cellular coats:—*both magnified.* 5. Cellular structure:—*highly magnified.*

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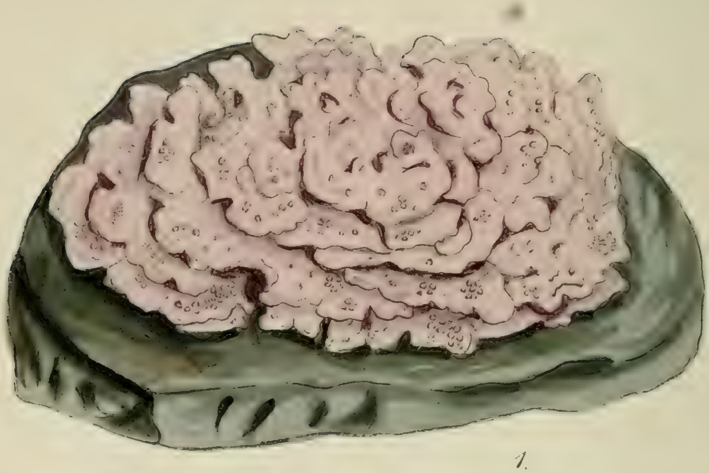

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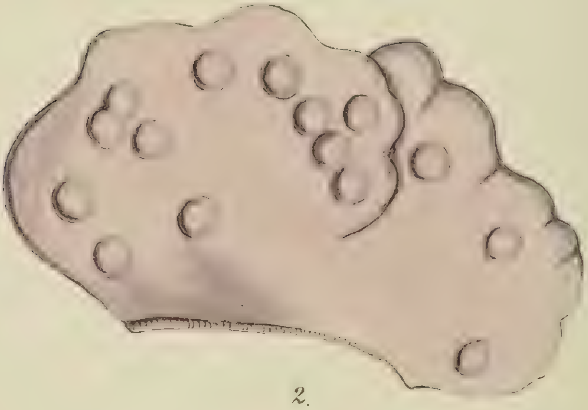

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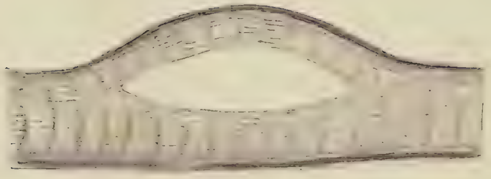

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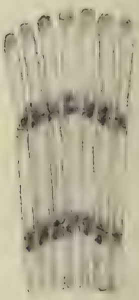

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W.H.H. d [illegible]

Reeve & Nichols imp.

PLATE CCCXLVI.

MELOBESIA LICHENOIDES, *Borl.* (sp.)

GEN. CHAR. *Frond* attached or free, either flattened, orbicular, sinuated or irregularly lobed, or cylindrical and branched (never articulated), coated with a calcareous deposit. *Fructification*: conical, sessile *ceramidia*, scattered over the surface of the frond, and containing a tuft of transversely parted, oblong *tetraspores.*—Named from one of the Sea-nymphs of Hesiod.

MELOBESIA *lichenoides*; frond attached to rocks, free at the margins, foliaceous, lichen-like, variously lobed; foliations spreading, often imbricated; ceramidia large, conical, prominent.

MELOBESIA lichenoides, *Harv. Man.* ed. 2. p. 109.

MILLEPORA lichenoides, *Borl. Cornw.* p. 239. pl. 24. f. 2, 3, 5. *Soland. Zoop.* p. 131. pl. 23. f. 10, 12.

HAB. On rocks and in tide-pools near low-water mark. Coast of Cornwall, *Rev. Dr. Borlase.* West of Ireland, abundant on the coasts of Galway and Clare, *W. H. H.* Coast of Cork, *Dr. Allman.* (Probably common on the W. and S. W. shores.)

GEOGR. DISTR. ?

DESCR. *Frond* thin and foliaceous, stony, spreading over rocks and stones in somewhat circular patches; not attached at the margins, and frequently but imperfectly attached in the centre. Many fronds grow together in the same patch, and their margins, which are much lobed and somewhat crenate, lie one over another. The lobes commonly extend in a horizontal direction, but sometimes stand erect; the habit varying greatly according to the place where the plant grows. *Ceramidia* large, prominent, obtusely conical, scattered, or collected in groups. *Cells* of which the substance is composed many times longer than their diameter. When the lime has been removed by acid, a thin slice shows a beautifully zoned structure under the microscope. *Colour* varying from dark lurid purple (in deep water) to creamy white near high-water mark. *Substance* thin and brittle.

This is by much the prettiest and most plant-like of the tidal *Nullipores,* strongly resembling in form and general habit one of the foliaceous lichens of the genus *Parmelia,* but differing in being of a stony substance;—thin however as paper, and very brittle. It is closely related to *M. agariciformis,* figured in one of our early numbers, from which it differs more in general habit than by any precise character; that species growing in globose masses, which are unattached, and lie, subject to the drifting of the waves, on the sea-bottom.

Mastophora licheniformis, Dcne., which Kützing refers to the plant now figured, is very different in many ways, generically and specifically.

Fig. 1. MELOBESIA LICHENOIDES; growing on a piece of rock:—*the natural size.* 2. Portion of a frond:—*magnified.* 3. Vertical section through an (*empty*) ceramidium:—*magnified.* 4. Portion of the cellular substance:—*highly magnified.*

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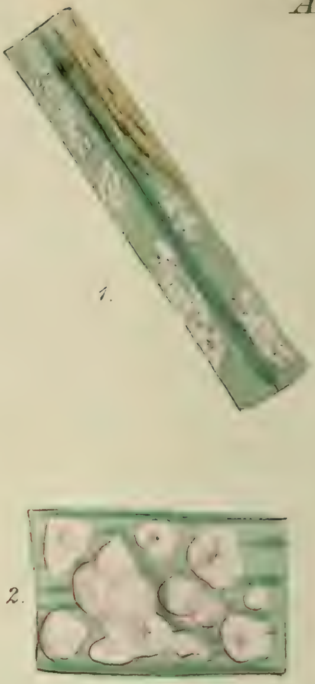

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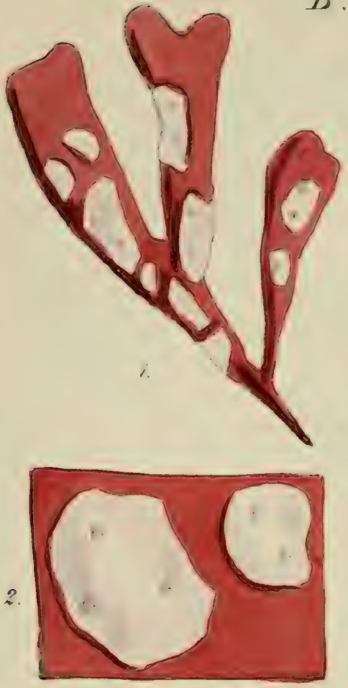

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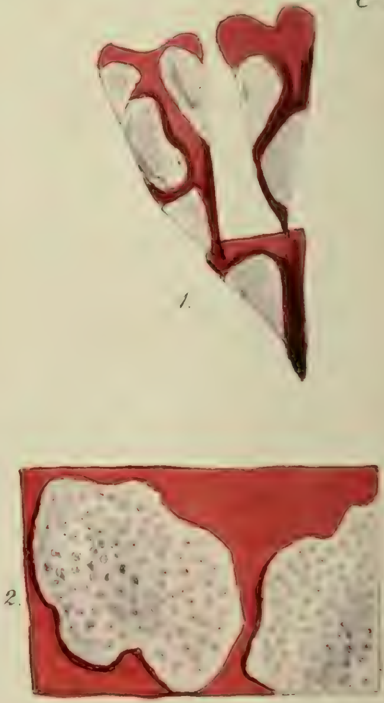

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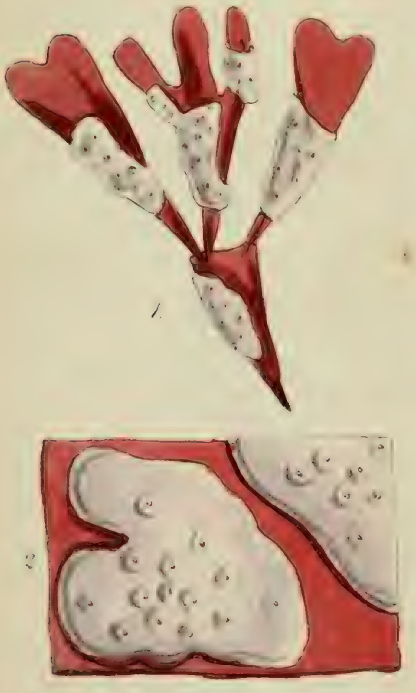

W.H.H. del et lith.

Reeve &

PLATE CCCXLVII. *A.*

MELOBESIA MEMBRANACEA, *Lamour.*

GEN. CHAR. *Frond* attached or free, either flattened, orbicular, sinuated or irregularly lobed, or cylindrical and branched (never articulated), coated with a calcareous deposit. *Fructification*: conical, sessile *ceramidia,* scattered over the surface of the frond, and containing a tuft of transversely parted, oblong *tetraspores.*—Named from one of the Sea-nymphs of Hesiod.

MELOBESIA *membranacea*; minute, dot-like, very thin, pale purple, circular, at length confluent, attached to other Algæ; ceramidia one or two, depressed.

MELOBESIA membranacea, *Lamour. Cor. Flex.* p. 315. pl. 12. f. 2, 3. *Harv. Man.* ed. 2. p. 109.

HAB. Common on the leaves of *Zostera,* the fronds of *Chondrus crispus,* &c. All round the coast.

GEOGR. DISTR. Atlantic and Mediterranean coasts of Europe.

DESCR. *Frond* from half a line to a line in diameter, very thin and filmy, circular at first, then, from several becoming confluent, more or less lobed or irregular. *Ceramidia* one or two, depressed.

A. Fig. 1. MELOBESIA MEMBRANACEA, growing on a leaf of *Zostera*:—*the natural size.* 2. A portion *magnified.*

PLATE CCCXLVII. *B.*

MELOBESIA FARINOSA, *Lamour.*

MELOBESIA *farinosa*; minute, irregular in outline, rather thin, pallid, with two or three prominent ceramidia.

MELOBESIA farinosa, *Lamour. Cor. Flex.* p. 315. pl. 12. *Harv. Man.* ed. 2. p. 109. *Kütz. Sp. Alg.* p. 696.

HAB. On various Algæ.

DESCR. Rather larger and thicker than the preceding, with more prominent fruit. In other respects similar.

B. Fig. 1. MELOBESIA FARINOSA, growing on *Phyllophora rubens*:—*natural size.* 2. A portion *magnified.*

Plate CCCXLVII. *C.*

MELOBESIA VERRUCATA, *Lamour.*

Melobesia *verrucata*; thin, expanded, irregularly lobed, pallid, dotted over with innumerable, small, pimply ceramidia.

Hab. With the preceding.

Descr. *Patches* from a quarter to half an inch in length, oblong, variously lobed at the margin, uneven. *Ceramidia* very numerous, minute.

C. Fig. 1. Melobesia verrucata :—*natural size.* 2. A portion *magnified.*

Plate CCCXLVII. *D.*

MELOBESIA PUSTULATA, *Lamour.*

Melobesia *pustulata*; thick, dull purple or green, oblong or lobed, incrusting, smooth; ceramidia numerous, large, rather prominent conical.

Melobesia pustulata, *Lamour. Cor. Flex.* pl. 12. f. 2. *a.* B. *Kütz. Sp. Alg.* p. 696. *Harv. Man.* ed. 2. p. 109.

Hab. On *Phyllophora rubens* and other Algæ; common.

Descr. *Patches* often an inch or more in length, and half an inch broad, thickish, of irregular form, frequently lobed, closely adhering to flat surfaces or clasping cylindrical stems, the surface more or less uneven. *Ceramidia* several on each patch, clustered, of large size in proportion to those of other allied species, prominent, conical. *Colour*, when well grown, a dark, reddish purple, changing to green and finally to white.

D. Fig. 1. Melobesia pustulata :—*natural size.* 2. A portion *magnified.*

I have thought it best to figure these four reputed species on one plate, that the slight differences noticed between them may be seen.

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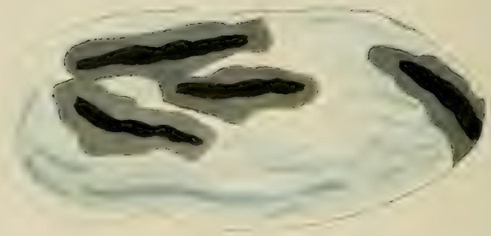
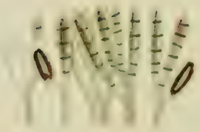
Plate CCCLXII





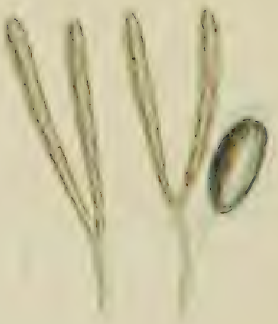


PLATE CCCXLVIII.

MYRIONEMA CLAVATUM, *Carm.* (sp.)

GEN. CHAR. *Minute* parasites, consisting of a mass of short, erect, simple, jointed filaments, which spring from a thin expansion formed of decumbent, cohering filaments, spreading in patches on the surface of other Algæ. *Spores* oblong, affixed either to the erect or to the decumbent filaments. MYRIONEMA (*Grev.*),—from *μυριος*, *numberless*, and *νημα*, a *thread.*

MYRIONEMA *clavatum*; "very minute, rather convex; filaments clavate, mostly bifid; spores obovate, pedicellate, affixed to the filaments."

MYRIONEMA clavatum, *Harv. in Hook. Br. Fl.* vol. ii. p. 391. *Harv. Man.* ed. 2. p. 51. *Kütz. Sp. Alg.* p. 540.

LINCKIA clavata, *Carm. Alg. App. ined. cum Ic.*

HAB. On a thin purple cartilaginous crust, probably a *Verrucaria*, which covers the pebbles at the half-tide level. Autumn. Appin, *Capt. Carmichael*, who adds, "The parasite is so much of the colour of the crust, it requires a microscope to detect it."

Of this curious little parasite I know nothing more than is learned from the above short description, which, with the two upper figures of our plate, is copied from Capt. Carmichael's manuscripts. The lower figure is added as an enlarged representation of a portion of the middle figure. I am indebted to the Rev. M. J. Berkeley for a sketch, copied from the original by Carmichael.

Fig. 1. MYRIONEMA CLAVATUM, growing on a dark-coloured crust, upon a quartz pebble:—*the natural size.* 2. The *Myrionema* filaments:—*magnified.* 3. A barren and fertile filament:—*more highly magnified.*

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Plate CCCXL

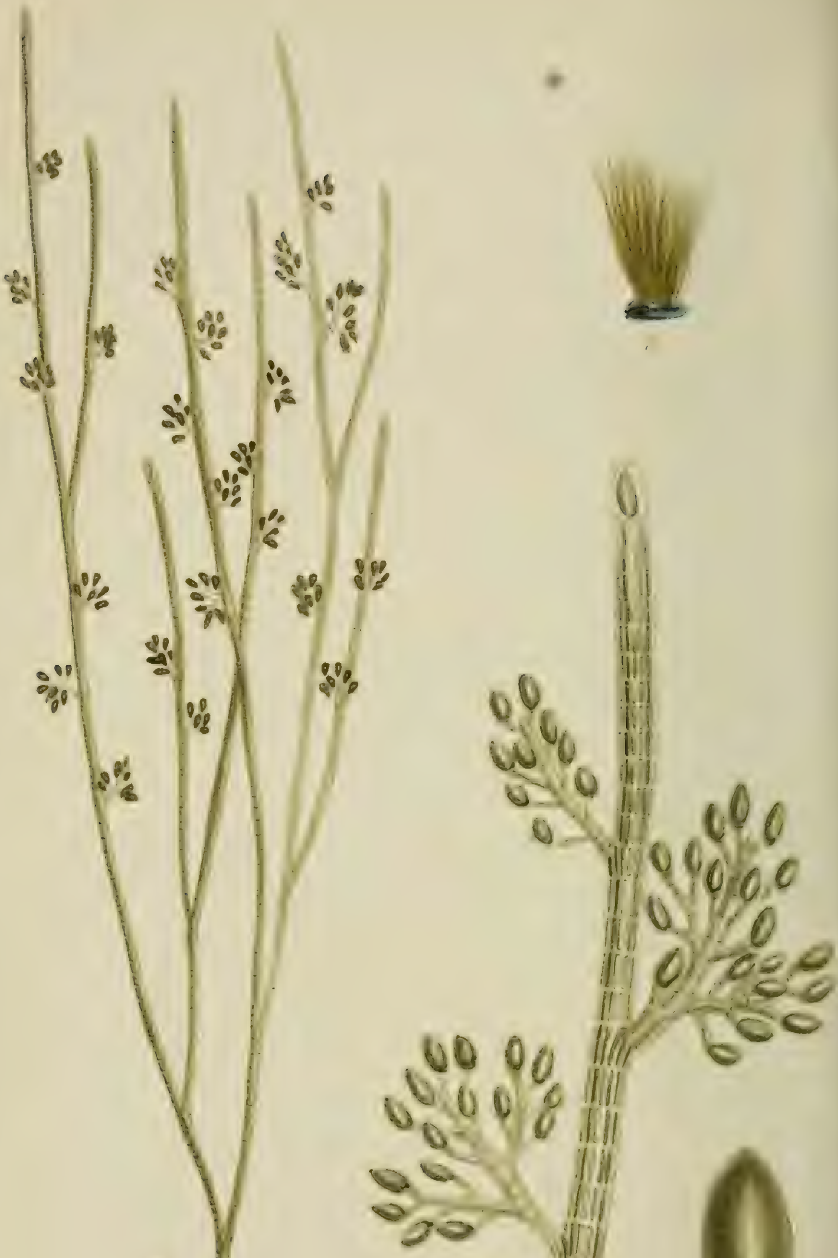

PLATE CCCXLIX.

SPHACELARIA RACEMOSA, *Grev.*

GEN. CHAR. *Filaments* jointed, rigid, distichously branched, pinnated; rarely simple or subdichotomous. *Apices* of the branches distended, membranous, containing a dark, granular mass. *Fructification*, elliptical *utricles* (or *spores*), borne on the ramuli. SPHACELARIA (Lyngb.), —from σφακελος, *gangrene*, alluding to the withered tips of the branches.

SPHACELARIA *racemosa*; "an inch in height, tufted, olivaceous, somewhat rigid, the fronds dichotomous; articulations equal in length and breadth; capsules oval, racemose, pedunculate." *Grev.*

SPHACELARIA racemosa, *Grev. Scot. Crypt. Fl.* vol. ii. t. 96. *Grev. Fl. Edin.* p. 314. *Harv. in Hook. Br. Fl.* vol. ii. p. 325. *Harv. Man.* ed. 1. p. 39. ed. 2. p. 57. *J. Ag. Sp. Alg.* vol. i. p. 31. *Kütz. Sp. Alg.* p. 466.

HAB. In tide-pools? Very rare. Frith of Forth, opposite to Caroline Park, *Sir John Richardson.*

GEOGR. DISTR. Only found in the above locality, and there only once (about the year 1821).

DESCR. "*Plant* tufted, about an inch in height, of an olive-green or olive-brown colour. *Frond* filiform, somewhat rigid, 3–4 times dichotomous, the dichotomies acute. *Articulations* equal in length and breadth, diaphanous to the base. *Summits* of the branches not sphacelated in my specimens, but somewhat dilated and hyaline, as in many other species previous to the sphacelation making its appearance. *Fructification*, oval capsules, surrounded by a very narrow pellucid border, pedicellate, and arranged in a racemose manner, on a common jointed peduncle. *Racemes* suberect, arising from various parts of the frond."—*Grev. Scot. Crypt. l. c.*

In this species we have the remarkable fact, occasionally met with in all departments of natural history, of a species distinguished by strongly marked characters having been seen but once, and that in very small quantity. The tuft from which Dr. Greville's figure, and the above description, which I have transferred from his work, were taken, has also served me in making the drawing for the plate now given, having been kindly placed in my hands for that purpose by Dr. Greville, with the liberal permission to abstract a fragment of the precious relic, to be preserved in the Dublin Herbarium. The singular grape-like fructification at once marks the species, and on the specimen found almost every thread had more or less numerous clusters. So that it fortunately happens, that a small specimen of this rarity is as characteristic as a much larger would be,—no small advantage, when a half-crown would cover all the specimens at present known to botanists. Dr. Greville has repeatedly sought it in vain in the spot on which the solitary tuft was picked up by Sir J. Richardson, previous to his first and memorable Arctic Voyage.

Fig. 1. Tuft of SPHACELARIA RACEMOSA :—*the natural size.* 2. Upper portion of a frond :—*magnified.* 3. Apex of a branch, with branches of spores ; and 4, one of the pedicellate spores :—*more highly magnified.*

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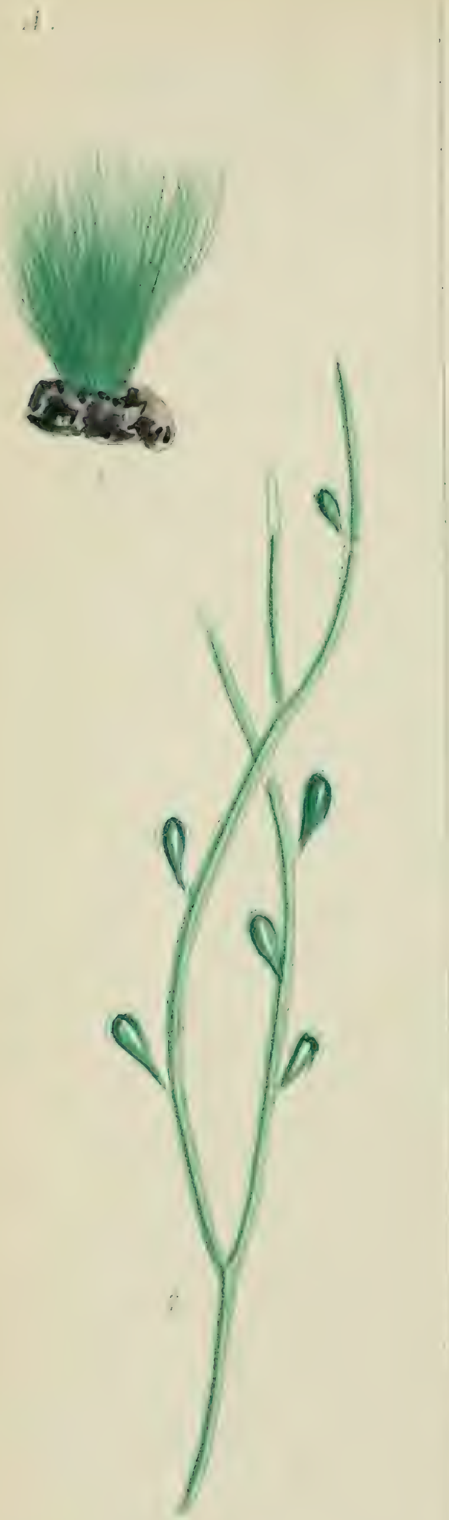
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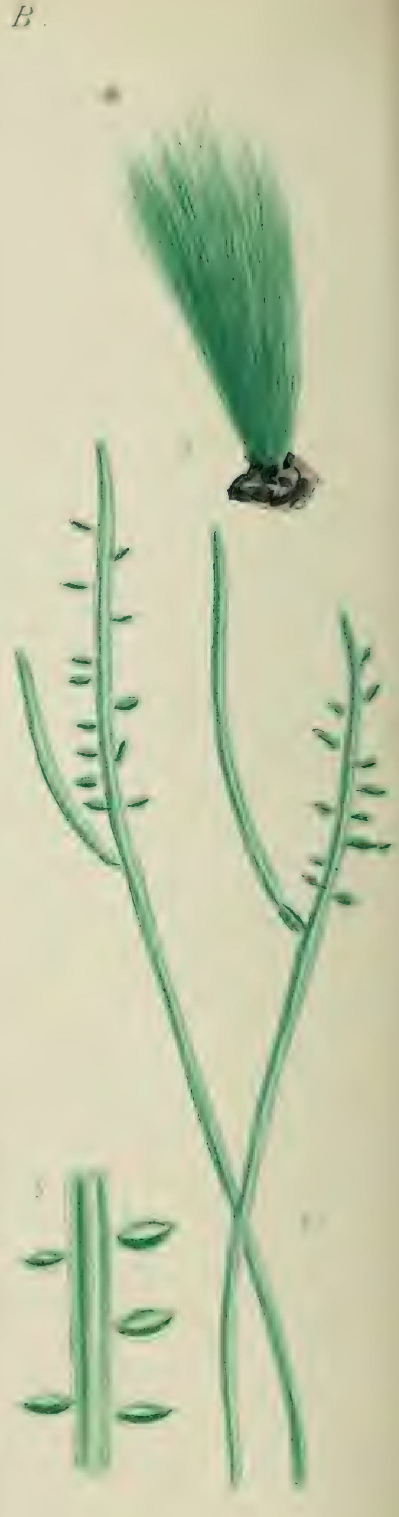
B.

PLATE CCCL. *A.*

VAUCHERIA MARINA, *Lyngb.*

GEN. CHAR. *Fronds* aggregated, tubular, continuous, capillary, coloured by an internal, green, pulverulent mass. *Fructification,* dark green, homogeneous *sporangia* (*coniocystæ*), attached to the frond.—*Grev.*—VAUCHERIA (DC.),—in honour of *M. Vaucher,* a distinguished Swiss writer upon fresh-water *Confervæ,* &c.

VAUCHERIA *marina*; filaments loosely tufted, or distinct; branches few, very long, obtuse; sporangia solitary, obovate, pedicellate, lateral. *Carm.*

VAUCHERIA marina, *Lyngb. Hyd. Dan.* p. 79. t. 22. *Hook. Br. Fl.* vol. ii. p. 319. *Harv. Man.* ed. 1. p. 14. ed. 2. p. 195. *Wyatt, Alg. Danm.* no. 168(?).

HAB. On sea-plants, mud, &c., between tide-marks. Annual. Summer. At Appin, on *Furcellaria fastigiata, Capt. Carmichael.* On mud at Torbay and Salcombe, *Mrs. Griffiths and Mrs. Wyatt.*

GEOGR. DISTR. Færoe Islands, *Lyngb.*

DESCR. *Fronds* forming more or less dense erect tufts one or two inches in height, very slender and flaccid, irregularly branched, somewhat dichotomous; branches few, erect, their granular contents sometimes interrupted at long interspaces. *Sporangia* few, scattered, broadly obovate or pear-shaped, very obtuse, tapering to the base into a short stalk. *Colour* a bright grass-green, becoming rather brownish, but retaining a gloss in drying.

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Not being able to prepare a satisfactory figure of this plant from dried specimens, and not having access to recent ones, I have copied, from the work of Lyngbye, a portion of his figure representing the magnified appearance of a branch in fruit. I regret that I was not earlier aware that a figure of his *V. marina* existed among the manuscript papers of the late Capt. Carmichael; a fact communicated to me since the plate was engraved and printed. Had I known it in time I should naturally have preferred publishing his drawing made from British specimens, to copying the published plate of a foreign author.

A. Fig. 1. Tuft of VAUCHERIA MARINA:—*the natural size.* 2. A portion of a filament in fruit:—*magnified*; copied from *Lyngbye.*
~~~

PLATE CCCL. *B.*

VAUCHERIA SUBMARINA, *Berk.*

VAUCHERIA *submarina*; "forked fastigiate threads; coniocystæ (sporangia) numerous, lanceolate and ovate, confined to the upper branches." *Berkeley.*

VAUCHERIA submarina, *Berk. Gl. Br. Alg.* p. 24. t. 8. *Hook. Br. Fl.* vol. ii. p. 319. *Hook. Man.* ed. 1. p. 147. ed. 2. p. 195.

VAUCHERIA dichotoma, β. submarina, *Ag. Syst. Alg.* p. 171. *Sp. Alg.* vol. i. p. 460. *Lyngb. Hyd. Dan.* p. 76. t. 20. A. *Grev. Alg. Brit.* p. 190.

HAB. On the muddy sea-shore. Weymouth, *Rev. M. J. Berkeley.*

GEOGR. DISTR. North Sea.

DESCR. "*Plant* growing in dense fastigiate masses in muddy spots covered by the sea every tide. Threads far slenderer than in *Vaucheria dichotoma*, stained below by the mud, above dark green, forked; the branchlets generally somewhat strangulated just above their insertion; the main stem clothed, above the part where the branchlet is given off, with numerous, almost sessile, more or less ovate or lanceolate coniocystæ, which are pointed, at first entirely green, but eventually with a pellucid border. One single instance occurred, in which the *fruit* consisted of two, placed end to end." *Berk. l. c.*

I am only acquainted with this species through Mr. Berkeley's description and figure, both of which I have here, with his permission, made use of.

B. Fig. 1. Tuft of VAUCHERIA SUBMARINA :—*the natural size.* 2. Filaments in fruit :—*magnified.* 3. A portion of a filament with sporangia :—*more highly magnified*; both copied from Mr. Berkeley's plate.

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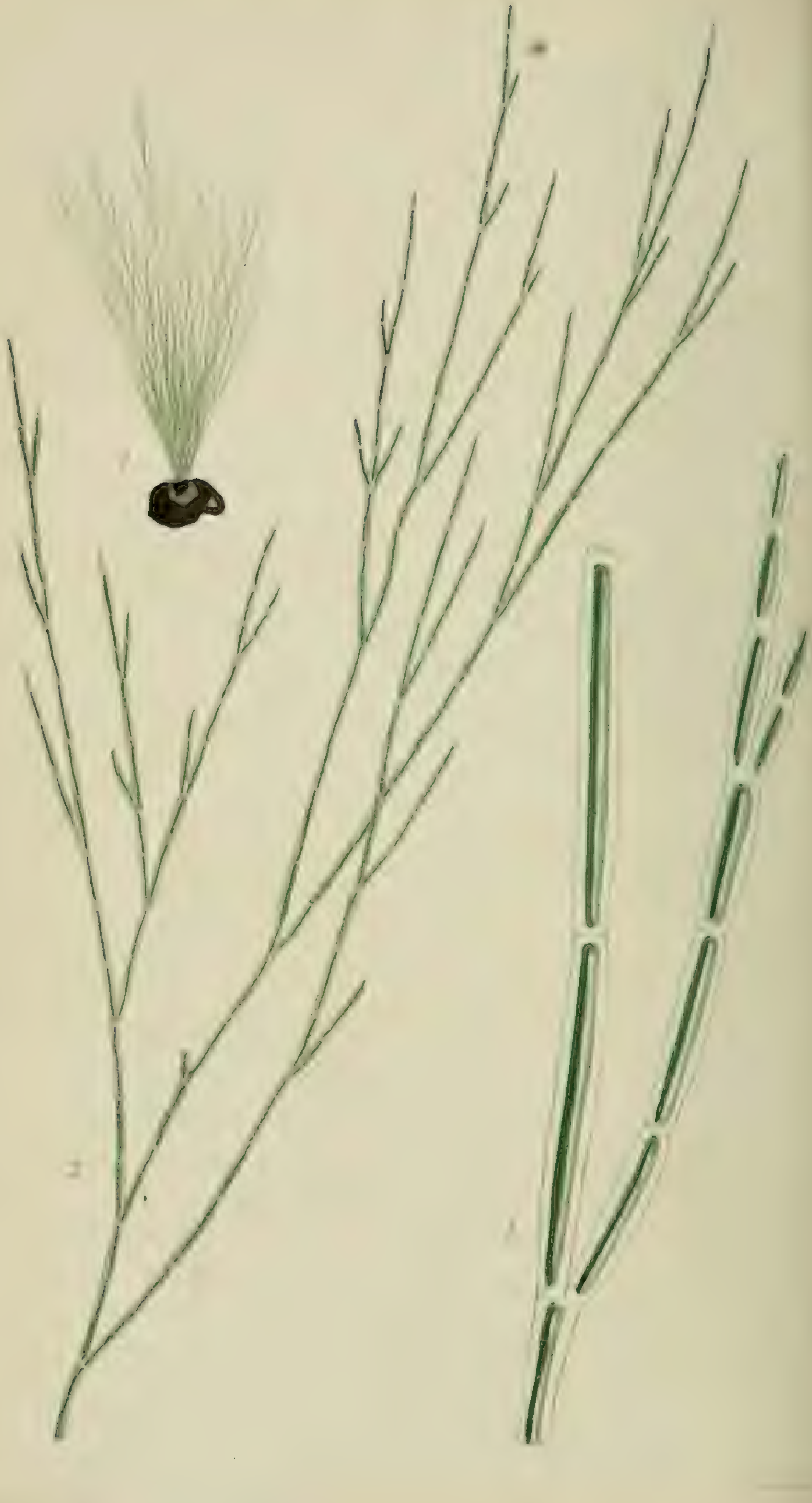
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PLATE CCCLI.

CLADOPHORA NUDA, *Harv.*

GEN. CHAR. *Filaments* green, attached, uniform, branched, composed of a single series of cells or articulations. *Fruit,* aggregated granules or zoospores, contained in the articulations, having, at some period, a proper ciliary motion. CLADOPHORA (*Kütz*),—from κλαδος, a *branch,* and φορεω, to *bear.*

CLADOPHORA *nuda*; filaments somewhat rigid, slender, very straight, dull-green, or olivaceous (when dry), sparingly dichotomous; ramuli few and scattered, appressed, the uppermost often opposite; articulations many times longer than broad.

CLADOPHORA nuda, *Harv. Man.* ed. 2. p. 101.

CONFERVA nuda, *Harv. in Mack. Fl. Hib.* part 3. p. 229. *Harv. Man.* ed. 1. p. 136.

HAB. On basalt rocks, between tide-marks. At Port Stewart, co. Antrim, *Mr. D. Moore.*

GEOGR. DISTR. —— ?

DESCR. *Filaments* loosely tufted, two or three inches high, capillary, sparingly branched, very straight, irregularly forked or sub-alternately divided; secondary branches distant and very erect, of various lengths, naked, or furnished with a few very erect or appressed, short ramuli, the upper ones of which are occasionally opposite. These ramuli are scarcely more slender than the other parts of the frond, and end in a bluntish point. The *articulations*, in the older parts, are many times longer than their breadth, and have thick walls, leaving a wide space surrounding the dull-green endochrome; the dissepiments are slightly contracted. The substance is rather rigid, and without gloss; and in drying the plant does not adhere to paper.

My knowledge of this species, if the plant here figured be entitled to rank as a species, is confined to a specimen collected by Mr. Moore, many years ago, on the coast of Antrim, and now preserved in the Dublin University Herbarium. It is undoubtedly nearly related to *C. rupestris,* from which, at first sight, it differs by its duller colour and more naked branches, and especially by the much longer articulations of the stem, and the wider borders of the tube. Still, I fear this character of long joints, which is the strongest of those mentioned, is not to be altogether counted on; for though I have not observed the joints in any specimen of *C. rupestris* to be of the extreme length of those of *C. nuda*, yet I have seen a tendency in some specimens of that species to produce long joints; and this, joined to the non-occurrence in recent times of *C. nuda*, has latterly disposed me to consider it a variety of *C. rupestris*. As, however, it has already obtained publicity both in this country and on the Continent, I think it deserving of being figured in this work, and shall be happy to find that future researches prove its title to receive a name. Last summer (1850) I sought for it diligently on the basaltic rocks in the neighbourhood of the Giant's Causeway, but in vain; and it was out of my power to extend the exploration as far as Port Stewart.

Fig. 1. CLADOPHORA NUDA:—*the natural size.* 2. Portion of a branch:—*magnified.* 3. Ramuli:—*more highly magnified.*

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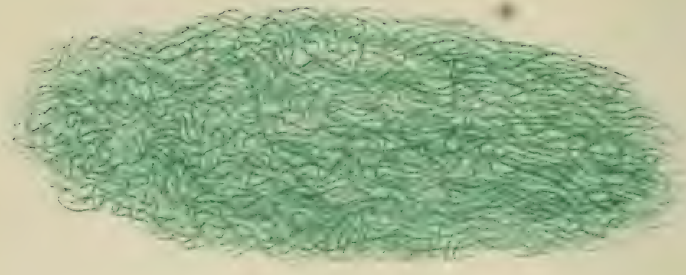

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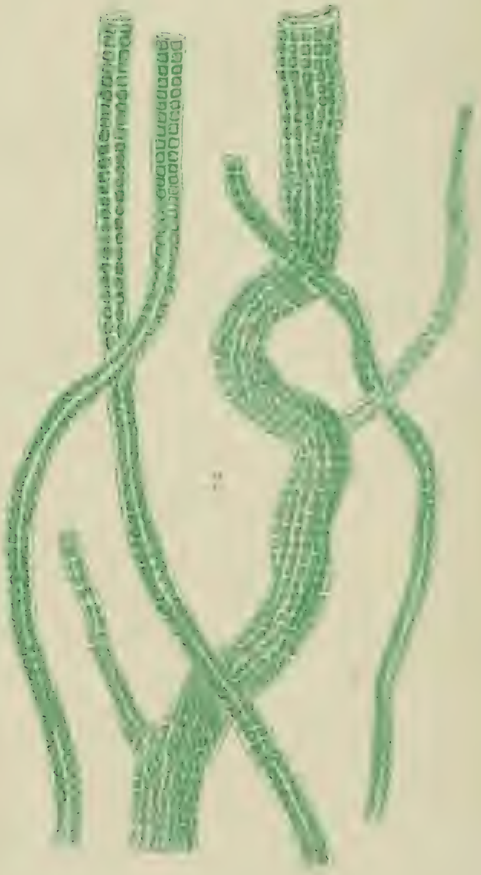

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PLATE CCCLII.

ENTEROMORPHA PERCURSA, *Hook.*

GEN. CHAR. *Frond* tubular, membranaceous, of a green colour and reticulated structure. *Fructification*: granules, commonly in fours, contained in the cells of the frond. ENTEROMORPHA (*Link*),—from εντερον, an *entrail*, and μορφη, *form* or *appearance.*

ENTEROMORPHA *percursa*; frond capillary, entangled and variously twisted, simple or having a few short spine-like ramuli, compressed, solid (?), reticulated; cells quadrate, two or more (generally two) in the breadth of the frond, the endochrome nearly filling the cell.

ENTEROMORPHA percursa, *Hook. Br. Fl.* vol. ii. p. 315. *Harv. Man.* ed. 1. p. 176. (*not ed.* 2. *p.* 215, *where the specific character applies to E. Ralfsii, Harv. Phyc. Br.* t. CCLXXXII.)

SOLENIA percursa, *Ag. Syst.* p. 187.

SCYTOSIPHON compressus, γ confervoideus, *Lyngb. Hyd. Dan.* p. 65. t. 15. f. B. 4–6.

HAB. Muddy sea-shores, at half-tide level. Annual. Spring and summer. Appin, *Capt. Carmichael.* Larne, *Mr. D. Moore.* Clontarf, *Miss Ball* (!). Tor Abbey, *Mrs. Griffiths* (mixed with *Lyngbya Carmichaelii,* &c.)

GEOGR. DISTR. Shores of Northern Europe.

DESCR. *Fronds* decumbent, several inches in length, forming widely spreading, entangled strata; each separate frond variously curled and twisted, and ordinarily of the diameter of human hair. Such fronds are usually quite simple, and formed of a double row of quadrate cells, filled with endochrome, with hyaline borders to each cell; thus the filament appears to be traversed by a colourless central line. Mixed with these characteristic threads are others of twice or four times the diameter, formed of a larger number of rows of cells; and these filaments, which have much the aspect of young plants of *E. compressa,* are frequently furnished with short, or long, simple branches, formed, like the ordinary threads, of a double row of cells. I have not been able (in dried specimens) to find any cavity traversing the filament, as is usual in the genus. The cells composing the filaments are nearly filled with green matter, leaving narrow borders. The colour is a brilliant grass-green, which is generally well preserved in drying; and the substance is membranaceous, and rather soft.

* * *

At Plate CCLXXXII. I have already given, under the name *E. Ralfsii,* a representation of an *Enteromorpha* communicated to me by Mr. Ralfs as *E. percursa*, but which our friend Mr. Thwaites decided to belong to a different species. In the present figure I hope I have given the true plant, but not having had the advantage of examining any authentically-named specimens, I am obliged to trust to the general accordance of the specimens here figured with the description given by Carmichael. My figure is drawn from a specimen collected by Miss Ball some years ago at Clontarf, and now in Herb. T. C. D., and it sufficiently accords with such specimens as I have examined from other parts of the coast. If the threads were all of one diameter, and all built of a double row of cells, there could be no difficulty in ascertaining the identity of the species; but unfortunately this is far from being the case in any specimen I have seen. The character by which *E. Ralfsii* differs is, the large size of the cells and the minuteness of the grain of endochrome in each. This, in the specimens seen, is very obvious. How far it may be of specific importance I cannot say.

Fig. 1. ENTEROMORPHA PERCURSA:—*the natural size.* 2. Portions of filaments of various sizes:—*highly magnified.*

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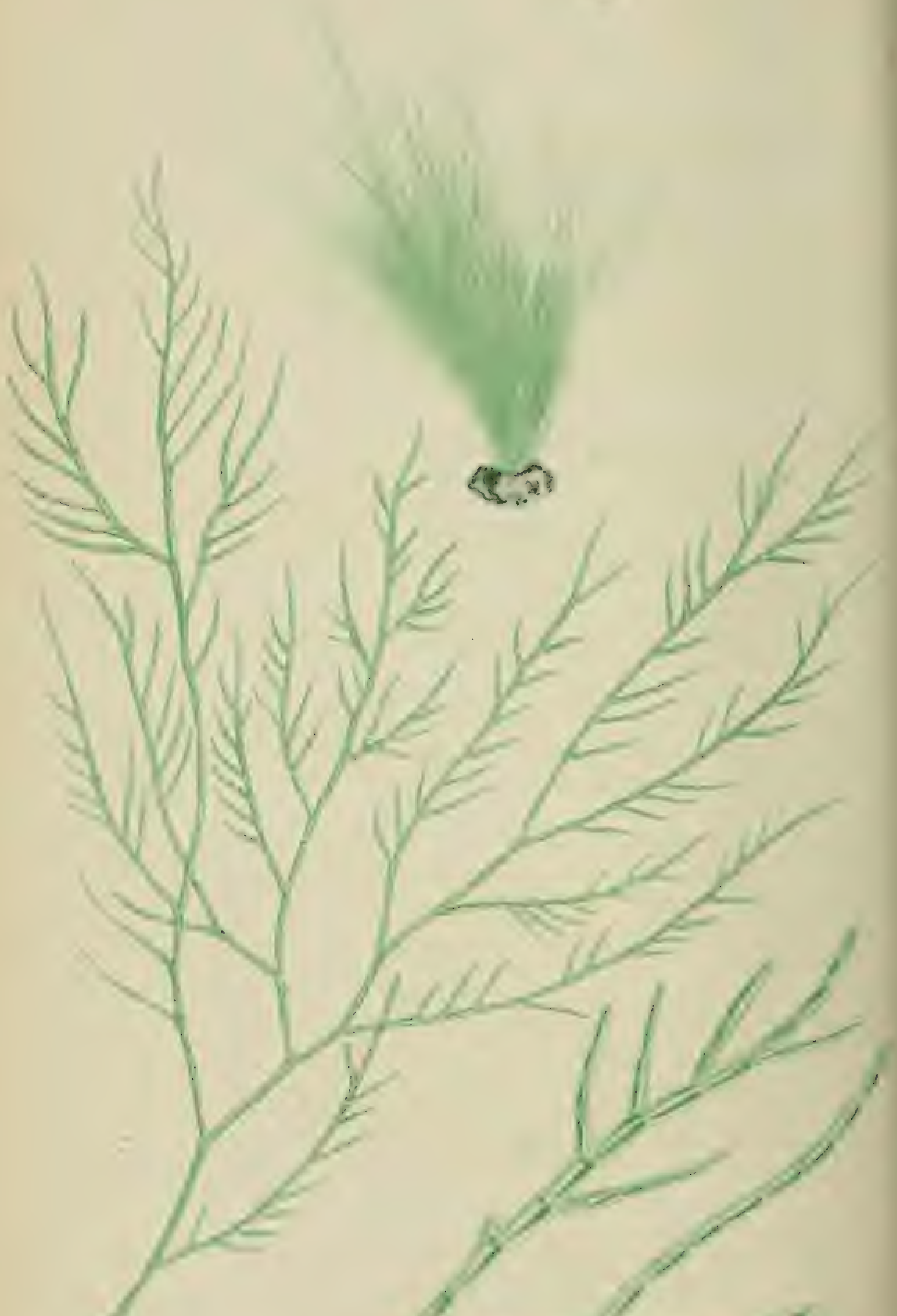

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PLATE CCCLIII.

CLADOPHORA FLEXUOSA, *Griff.*

GEN. CHAR. *Filaments* green, attached, uniform, branched, composed of a single series of cells or articulations. *Fruit,* aggregated granules or zoospores, contained in the articulations, having, at some period, a proper ciliary motion. CLADOPHORA (*Kütz.*),—from κλαδος, a *branch,* and φορεω, to *bear.*

CLADOPHORA *flexuosa;* filaments capillary, flexuous or angularly bent, pale green, much branched, the branches of unequal length and (comparatively) but little divided, set with curved secondary or tertiary branches, which are pectinated with secund, short, simple, spreading ramuli; articulations of the branches thrice or four times, of the ramuli twice as long as broad.

CLADOPHORA flexuosa, *Griff.! in Wyatt, Alg. Danm.* no. 227. *Harv. Man.* ed. 2. p. 202 (in part; the synonyms of Dillwyn and Eng. Bot., there quoted, being doubtful.)

CLADOPHORA sirocladia, β gracilis, *Kütz. Sp. Alg.* p. 392.

HAB. In rock-pools, between tide-marks, attached to other Algæ. Torquay, *Mrs. Griffiths.* (Other recorded stations require re-examination and verification.)

GEOGR. DISTR. (Doubtful.)

DESCR. *Filaments* capillary, three to six inches long, tufted, much branched, but not so densely bushy as several allied species, the principal branches angularly bent, and the secondary and tertiary branches, which are long and of unequal lengths, bent from side to side in an undulating manner. From the projecting angles of the bent branches, at either side, spring other lesser laterals, which are usually simple, and either naked, or more commonly pectinated along one side with several short ramuli, each of four or five articulations. These ramuli on some specimens are found lengthening out into branches, and again bearing ramuli. All the divisions are curved. The articulations in the stem are from three to four times as long as broad, not contracted at the joints; those of the ramuli are gradually shorter, and very little contracted, expanding nearly to their full shape when moistened after having been dried. The colour is a pleasant green, tolerably retained in drying. The substance is membranaceous, and the plant adheres to paper.

Not being in possession of any authentic specimen of the *Conferva flexuosa* of Dillwyn, on which the present species is supposed to be founded; and, also, having good reason to doubt the identity of the plant here figured with that figured by Dillwyn, I think it best to abstain quoting any synonym or habitat which I have not recently verified. My figure and description therefore have reference alone to the specimens published by Mrs. Griffiths in Wyatt's 'Algæ Danmonienses,' and to such as agree with them in character. I am not very sanguine of the validity of this species, and, notwithstanding some differences in minor characters, would place it near *C. glaucescens*, to which it is closely related. The general aspect is not unlike that species, and the articulations are of about the same length; but here the stem and branches are more flexuous, the ramuli shorter in proportion, and the dissepiments are less contracted. I am not disposed to place much reliance on any of these characters.

Meanwhile, as the plant has been published in a work of such celebrity as the 'Algæ Danmonienses,' it is right that it should have a place in our volumes.

Fig. 1. Cladophora flexuosa :—*the natural size.* 2. Portion of a filament :—*magnified.* 3. Small portion of the same :—*more highly magnified.*

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1.

2.

PLATE CCCLIV. *A.*

CONFERVA ARENICOLA, *Berk.*

GEN. CHAR. *Filaments* green, attached or floating, unbranched, composed of a single series of cells or articulations. *Fruit,* aggregated granules or zoospores, contained in the articulations, and having, at some period, a proper ciliary motion. CONFERVA (*Plin.*),—from *conferruminare,* to *consolidate*; because some of the species were used by the ancients for binding up fractured limbs.

CONFERVA *arenicola*; "threads soft, simple, extremely fine, matted, somewhat crisped, at first uniform pale green, at length distinctly jointed; articulations once and half as long as broad, dotted; interstices pellucid."—*Berk.*

CONFERVA arenicola, *Berk. Gl. Br. Alg.* p. 36. t. 13. f. 3. *Harv. Man.* ed. 1. p. 128. ed. 2. p. 207.

HAB. Salt marshes, within reach of the tide, *Rev. M. J. Berkeley.*

DESCR. "Creeping on the sandy margins of pools in a salt marsh periodically flooded, forming a thin, soft, delicate, crisped web of a pale yellow-green. *Threads* extremely slender, flexuous, at first self-coloured with a few scattered dots, then with manifest dissepiments, and finally the granules contract and form a distinctly defined mass of a darker green in the centre, with pellucid interstices. Articulations 1½ as long as broad. When dry the articulations are alternately contracted."—*Berk. l. c.*

* * *

I am indebted to Mr. Berkeley, from whose 'Gleanings' I copy the above account, for a loan of the original specimen from which his description was prepared. This I have used in preparing the magnified portion of the figure. Except in colour, this plant bears a close resemblance to *C. implexa.* I am not aware that it has been noticed more than once.

A. Fig. 1. Web of CONFERVA ARENICOLA, as presented to the naked eye.
2. Filaments from the same:—*highly magnified.*

PLATE CCCLIV. *B.*

RHIZOCLONIUM CASPARYI, n. sp.

(For GEN. CHAR. see Plate CCXXXVIII.)

RHIZOCLONIUM *Casparyi*; filaments elongated, extremely slender, decumbent, pale yellow-green, stratified, interwoven, curved and here and there angularly bent; at the angles emitting short root-like branches, which sometimes lengthen, and are filled with endochrome; articulations 2–6 times longer than broad, with narrow dissepiments and granular endochrome.

HAB. At Falmouth and Penzance, *Dr. Robt. Caspary.*

DESCR. Forming a thin web of a bright green colour and considerable extent. *Filaments* elongate, more slender than those of *R. riparium*, gracefully curved rather than twisted, interwoven, here and there angularly bent. At the angle issues a root-like process, which sometimes consists but of a few empty cells; at other times lengthens out into a branch. *Cells* in the same fleece very various, and even in the same filament at different ages: the full-grown cell seems to be fully six times as long as its diameter; but short cells once and a half to twice as long as broad, which seem to be cells in process of development are commonly mixed with the long cells. All contain a granular endochrome, the grains of very unequal size.

* * *

Having a half plate to spare, I take the opportunity of figuring a *Rhizoclonium*, sent to me some months ago by Dr. Caspary, and found by him near Penzance and Falmouth. It has more slender filaments than the ordinary *R. riparium*, and occasionally appears with longer joints. But the joints vary extremely in different threads, and even in the same thread, so that I find it difficult to fix any satisfactory character by which it can be known from *R. riparium*, in the absence of ascertained specimens of that plant. The root-like branches are sometimes much more developed than is shown in the figure, which was made from less mature specimens than I afterwards received.

B. Fig. 1. Web of RHIZOCLONIUM CASPARYI, as it appears to the naked eye. 2. Filaments from the same:—*magnified.* 3, 4. Portions of different filaments, in one of which the cells have divided, in the other attained their full size.

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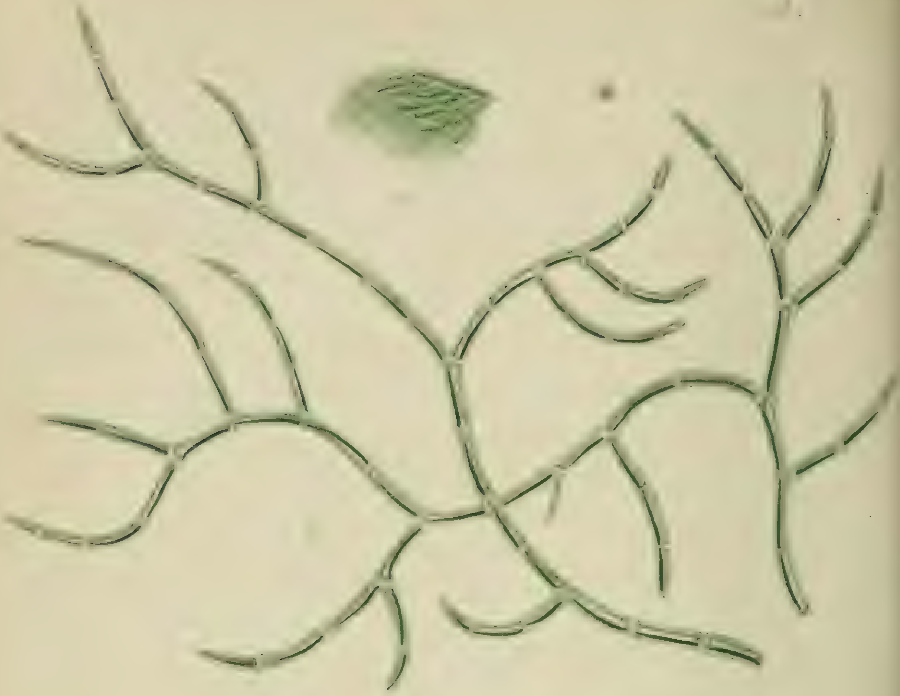

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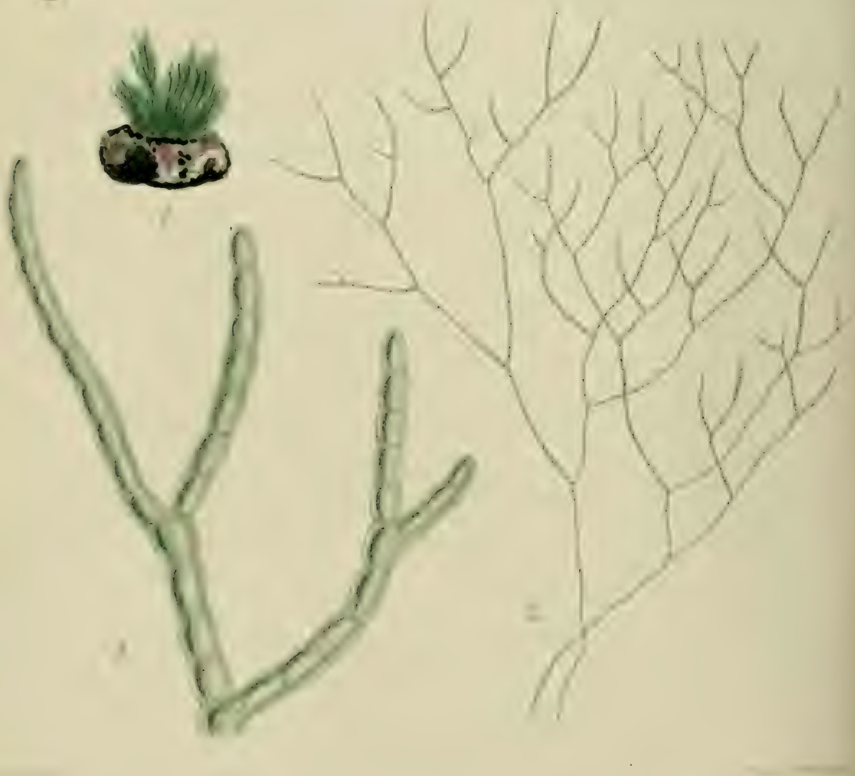

PLATE CCCLV. *A.*

CLADOPHORA MAGDALENÆ, n. sp.

GEN. CHAR. *Filaments* green, attached, uniform, branched, composed of a single series of cells or articulations. *Fruit,* aggregated granules or zoospores, contained in the articulations, having, at some period, a proper ciliary motion. CLADOPHORA (*Kütz.*),—from κλαδος, a *branch,* and φορεω, to *bear.*

CLADOPHORA *Magdalenæ*; filaments capillary, blackish-green, short, decumbent (?), matted together, slightly branched, irregularly bent; branches patent or divaricate, curved, dichotomous or secund, with wide axils; ramuli few, spreading, falcate, as thick as the cells from which they spring; articulations thrice or four times as long as broad, filled with very dense opake endochrome; dissepiments very narrow, not contracted.

HAB. At Jersey, *Miss Magdalene Turner.*

DESCR. *Filaments,* in the only specimen examined, about an inch long, matted together, but not tufted, apparently growing either prostrate or entangled among the bases of other Algæ, not much branched. *Branches* irregularly dichotomous, or angularly alternate, spreading with wide angles, often divaricate, curved, simple or once or twice divided; naked, or furnished with a few secund, falcate ramuli. *Articulations* thrice or four times as long as broad, those of the ramuli the shortest, filled with a very dense, dark green, minutely granulated endochrome (resembling that of *C. rupestris*); the dissepiments very narrow and scarcely at all contracted. The apices obtuse. *Substance* somewhat rigid, not adhering to paper in drying. *Colour* a dark, dingy-green.

Not knowing to what described species to refer the apparently distinct little plant here figured, I give it a provisional name. Unlike as it is in ramification and general aspect to *C. rupestris,* the cells under the microscope strongly resemble those of that species; yet I can hardly think it next of kin to that straight-growing plant, and perhaps *C. fracta* is more nearly related.

Had it been more certainly characterized or more pleasing to the eye, I should have felt a greater pleasure in naming it from its discoverer, to whom this work is indebted for many interesting additions, and for a large proportion of whatever information it affords on the Algæ of Jersey.

A. Fig. 1. CLADOPHORA EXILIS:—*the natural size.* 2. Portion of filaments:—*magnified.*

PLATE CCCLV. *B*.

CLADOPHORA GATTYÆ, n. sp.

CLADOPHORA *Gattyæ*; filaments an inch long, dingy-green, capillary, matted together in dense tufts, not much branched, dichotomously divided, flexuous, with few ramuli; articulations in all parts of the frond nearly uniform, about once and half as long as broad, filled with endochrome; the dissepiments very narrow, contracted.

HAB. On rocks (?) near low-water mark. Locality uncertain, *Mrs. Gatty*.

DESCR. *Filaments* about an inch long, as thick as human hair, or somewhat thicker, matted together in dense ropy tufts, irregularly branched, somewhat dichotomous, the angles rounded; ramuli few and patent. *Articulations* very uniform, about once and half as long as broad; filled with olivaceous (?) or dull green endochrome, and separated by exceedingly narrow dissepiments. *Apices* on my specimen often broken. *Substance* membranaceous, adhering to paper.

* * *

A puzzle, figured with the hope that it may lead to more certain information. The external habit is between that of *C. uncialis* and *Ectocarpus littoralis*, but the threads are very much more robust than in the former; and differently branched from the latter, as well as more robust. The plant is, however, much battered and water-worn, having most of its upper branches and ramuli broken off:—and I am not prepared to say whether it be not some species in a dilapidated condition, whose proper character is thus concealed, or as it were shown in caricature.

B. Fig. 1. CLADOPHORA INAMŒNA:—*the natural size*. 2. Filaments:—*magnified*. 3. Small portion of the same:—*more highly magnified*.

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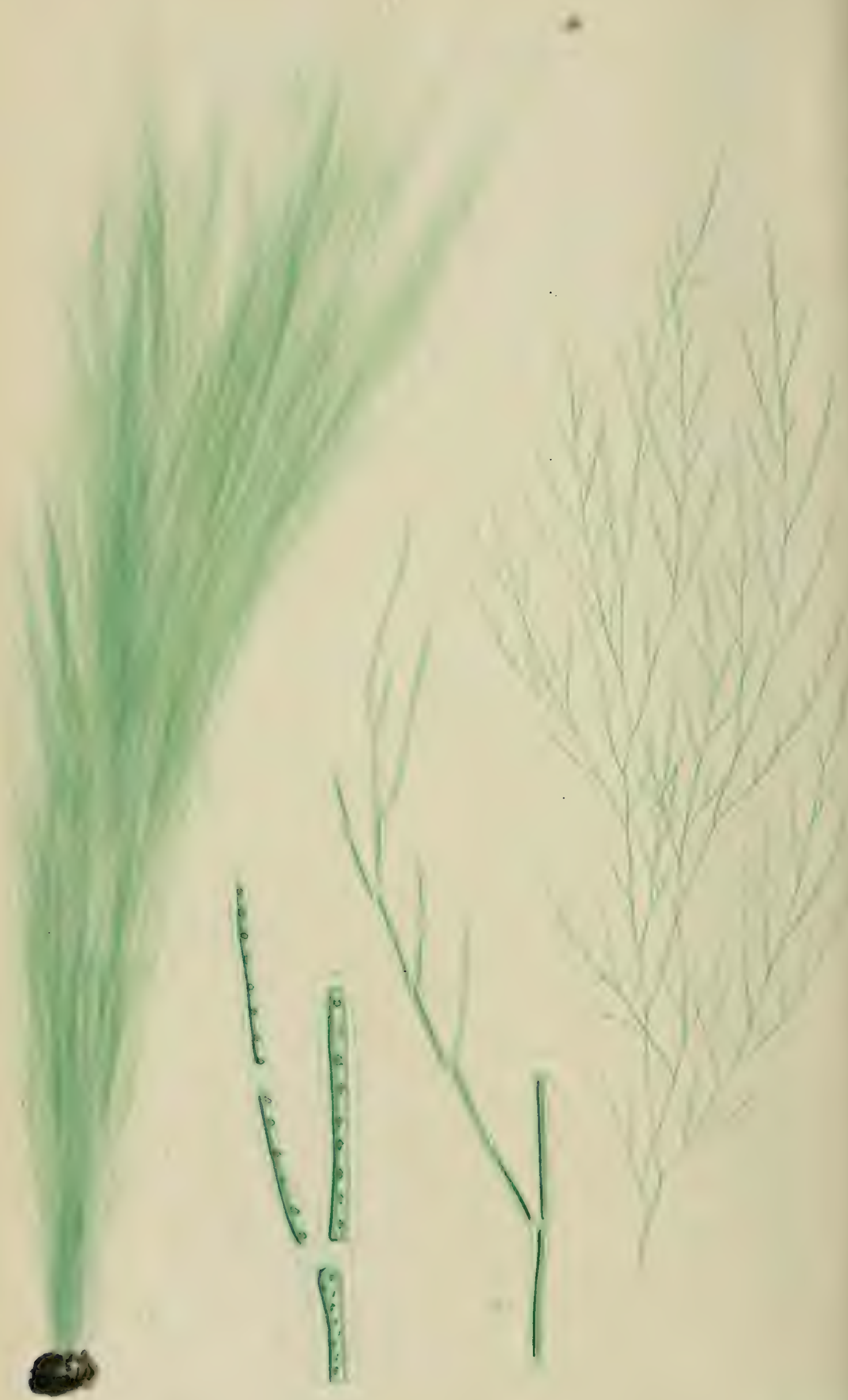
Plate CCCXLII.



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Reeve & Reeve

Plate CCCLVI.

CLADOPHORA BALLIANA, *Harv.*, n. sp.

Gen. Char. *Filaments* green, attached, uniform, branched, composed of a single series of cells or articulations. *Fruit,* aggregated granules or zoospores, contained in the articulations, having, at some period, a proper ciliary motion. Cladophora (*Kütz.*),—from κλαδος, a *branch,* and φορεω, to *bear.*

Cladophora *Balliana*; filaments elongate, extremely slender, soft, grass-green, much branched; the branches excessively divided, the penultimate ones virgate, and set with slender, secund, one- or two-jointed ramuli; articulations of the branches eight or ten times as long as broad, of the ramuli six to eight times, all filled with dense, granular endochrome; dissepiments broad and hyaline.

Hab. Sea-shores. At Clontarf, *Miss Ball* (May 16, 1843).

Geogr. Distr. —— ?

Descr. *Filaments* finer than human hair, from six to eight or ten inches long, tufted and much branched, the branching repeatedly alternate, but irregular and difficult to trace; with a more or less evident leading stem. Lesser branches one or two inches long, somewhat virgate, undivided, set with other minor branches, which again bear numerous short, pectinate ramuli, generally along their inner faces. These ramuli are much more slender than the joint from which they spring, and usually consist of but two cells, but occasionally lengthen out into several. The branches and lesser divisions taper, at the extremity, into a slender point. The endochrome filling the cells is remarkably dense, granular, and in great measure recovers its form on remoistening after the plant has been dried; and is of a full grass-green. The length of the cells in the principal divisions is from eight to ten times their diameter, or perhaps more; in the ramuli the cells are shorter. The border of the tube and the dissepiments are both very wide in proportion to the part occupied by endochrome. The substance is soft and tender, and the plant closely adheres to paper in drying.

I am glad, in closing the 'Phycologia,' to have an opportunity of paying a grateful tribute to the fair discoverer of the present beautiful species, from whom I have, during the course of this publication, received much assistance—in supplies of specimens, &c.—and to whose acute eye the Irish Flora is indebted for the addition of many interesting species. *Cladophora Balliana,* not the least beautiful of these, is readily known from all its British congeners but one, by the tenuity and lubricity of the filament, in conjunction with the great length of the cells. The only species with which it can be confounded is *C. Rudolphiana,* but the ramification is so different in that plant, that, notwithstanding a near agreement in the length of the articulations and the general aspect of the tufts, there can be little difficulty in distinguishing one from the other.

As yet I have only seen the specimens collected by Miss Ball, so long ago as 1843. As I have been in no haste to publish it as a novelty, I hope it may stand permanently as a good species.

Fig. 1. CLADOPHORA BALLIANA:—*the natural size.* 2. Portion of a filament:—*magnified.* 3. Branchlet, and 4, part of the same:—*less and more highly magnified.*

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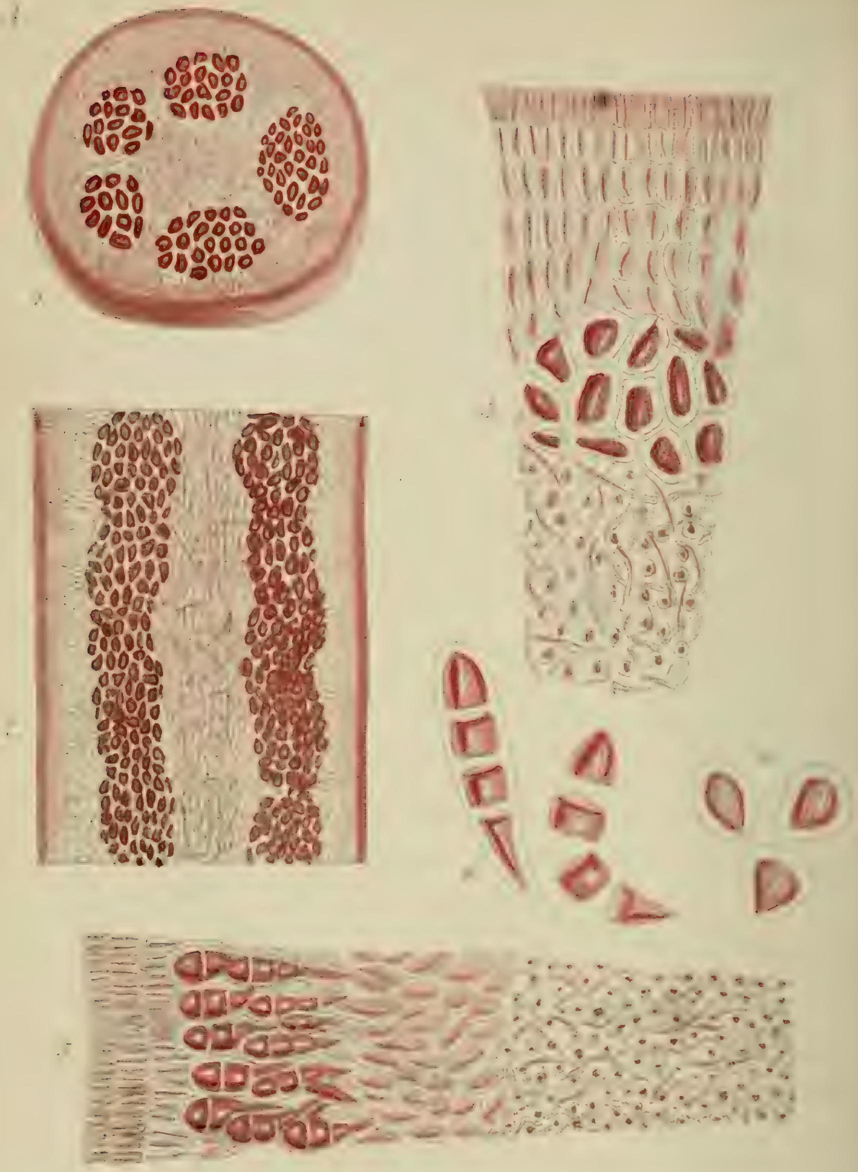
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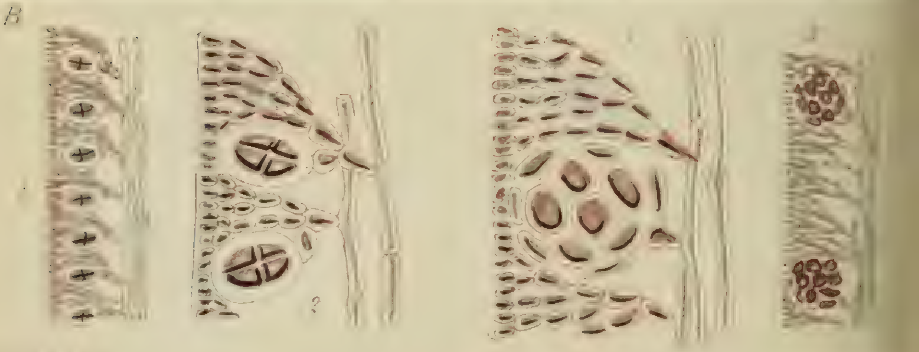
B

Plate CCCLVII. *A.*

FURCELLARIA FASTIGIATA, *Lamour.*

(For description, &c., see Plate XCIV.)

My remarks appended to Pl. XCIV. had scarcely been made public when I received from Mrs. Griffiths specimens of *F. fastigiata* in both kinds of fruit, which I regret had not reached my hands in time to withhold both that plate, of which the analytic figures 3 and 4 are incorrect, and the remarks appended to it, so far as they refer to the fructification.

Dr. Caspary has given, in the Annals of Natural History (Second Series, vol. vi. p. 87), a minute account of the comparative structure of *Furcellaria* and *Polyides*, with micrometric measurements of the cells composing the various strata of their fronds; but it is due to Mrs. Griffiths to state that she has long been perfectly well acquainted with the fructification of *Furcellaria*, figures of which I now give in detail.

Fig. 1 represents a cross section of one of the pod-like branches, of which fig. 2 is a longitudinal cutting. Fig. 1 shows five *favellæ* formed from the large cells immediately in contact with the fibro-cellular axis. In fig. 2, two of these favellæ are shown, prolonged by several superimposed favellæ having become confluent, as is almost always the case in fully ripe specimens. Fig. 3 is a small transverse slice, to show the cells more highly magnified; fig. 4 represents some spores separated. Fig. 5 is a transverse segment of a frond producing *tetraspores*, which are formed in several rows (according to age) from the cells of the middle stratum most distant from the axis. These *tetraspores* (fig. 6) are pear-shaped and transversely zoned.

I am indebted to Mrs. Griffiths for numerous and beautiful specimens of both kinds of fruit in the most perfect state.

PLATE CCCLVII. *B.*

DUMONTIA FILIFORMIS, *Grev.*

(See description under PLATE LIX.)

The analysis in Pl. LIX. fig. 2 and 3, and the generic character, are both faulty. It is hoped that the figures now given will show the proper structure of the walls of the frond, and the position of the fructification; and the following emended generic character is offered:—

GEN. CHAR. *Frond* tubular; the tube at first occupied by a lax network of longitudinal, anastomosing filaments; at length distended and empty. Walls composed of longitudinal, anastomosing filaments, emitting toward the circumference dichotomous, moniliform branches, which form a middle stratum; cortical stratum composed of a single layer of small cells. *Favellæ* roundish, formed by a metamorphosis of the dichotomous branches. *Tetraspores* dispersed, cruciate, with wide limbs, sunk beneath the cortical stratum, formed of one of the cells of the dichotomous branchlet.

From this it will be seen that *Dumontia* has nearly the same structure as *Catenella*, omitting the constricted branches. The statement made under Pl. LIX. that I had seen no tetraspores of this common plant, has brought me specimens from several kind correspondents, to whom my thanks are due. At the same time (to my shame be it spoken) I find, on examining some old specimens collected in 1832, that I ought to have made no such statement, and further, that the *tetraspores* of this Alga are very common. It sometimes happens that botanists are less acquainted with the structure of very common than of rarer plants, and in this instance I have to plead guilty to a careless want of observation.

B. Fig. 1. Vertical slice of the wall of DUMONTIA FILIFORMIS, with *tetraspores.*
2. Small portion of the same. 3. Vertical slice of a specimen with *favellæ.*
4. Small portion of the same:—all the figures *more or less highly magnified.*

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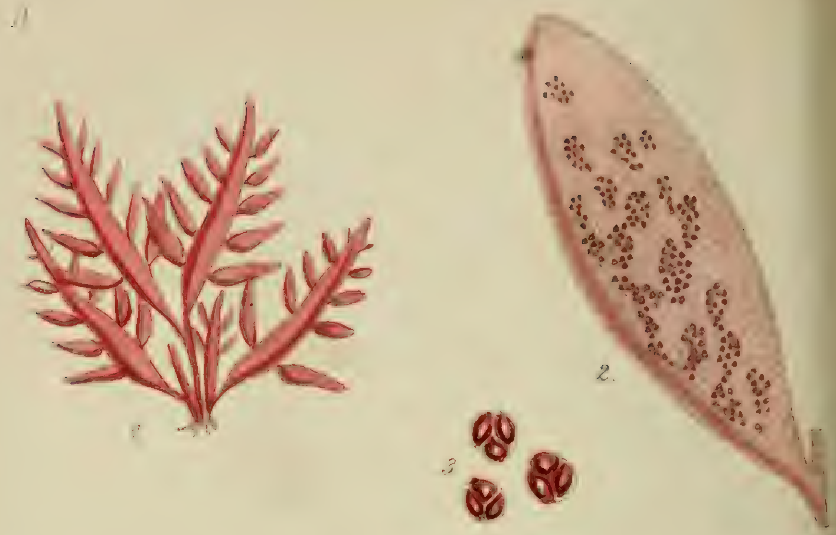
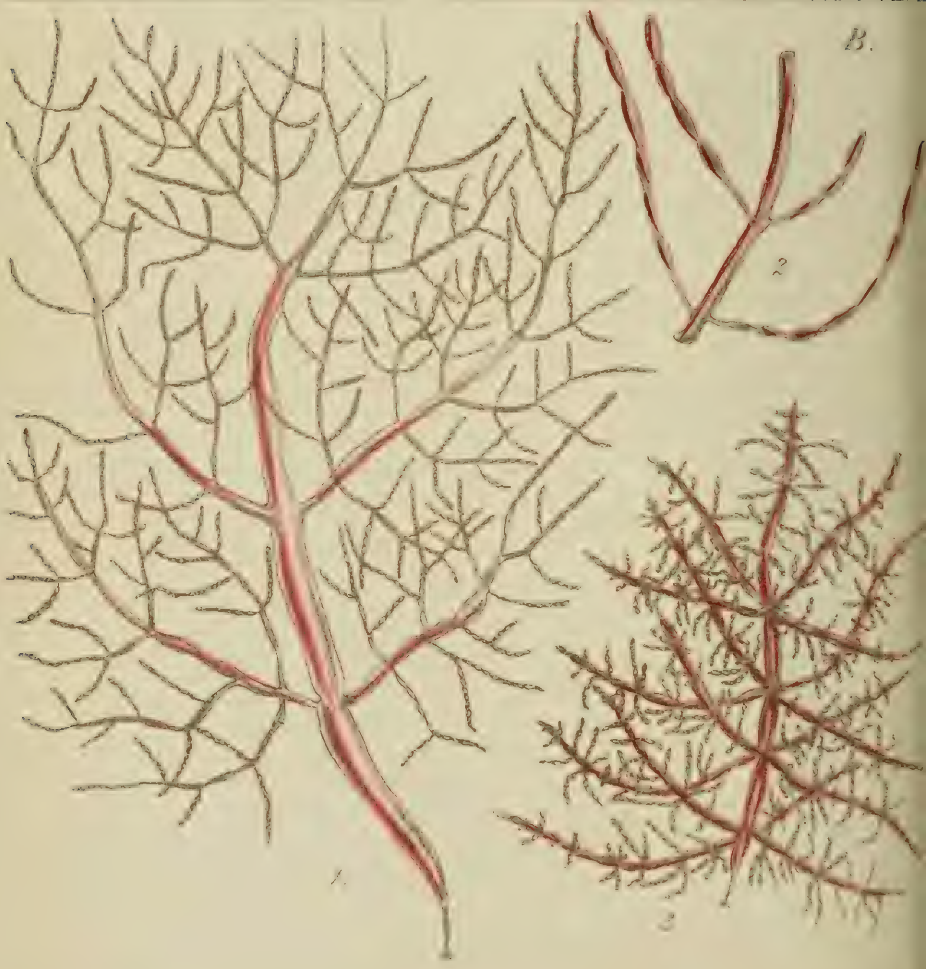
Plate CCCLVIII.





W.H.H. del. et

PLATE CCCLVIII. *A.*

CHRYSYMENIA ROSEA, *Harv.*

(For description see PLATE CCCI.)

I have nothing to add to the account already given of this plant under the above-quoted figure, but merely redeem my pledge by figuring one of Mrs. Gatty's Filey specimens, to contrast with the figure of the Orkney plant already given. The Filey specimen is taller, narrower in proportion, with better developed pinnæ, and is in fruit. Though narrow, in comparison to the Orkney variety, it is greatly broader than any form of *C. clavellosa* with which I am acquainted; but I have been assured by Dr. Walker Arnott that a drawing exists in the late Mr. Brodie's Herbarium, which Dr. Arnott considers identical with my *C. rosea.* I possess specimens of *C. clavellosa*, var. *sedifolia*, of Mr. Brodie's gathering, but they are very unlike the plant here figured.

A. Fig. 1. CHRYSYMENIA ROSEA:—*the natural size.* 2. A ramulus with *tetraspores*:—*magnified.* 3. Tetraspores:—*highly magnified.*

PLATE CCCLVIII. *B.*

CHYLOCLADIA KALIFORMIS, *vars. β & γ.*

(For description, &c., see PLATE CXLV.)

Under Pl. CXLV. I have characterized what I consider to be two varieties of *C. kaliformis*, but which continental correspondents have sent me as distinct species. The former, our var. *β, patens*, being the *Ch. patens*, Kütz., and the latter, *γ, squarrosa*, the *Ch. squarrosa* of the same author. As there was not room to represent these forms on Pl. CXLV., I avail myself of the present opportunity to figure them. The specimens here drawn are Irish, fig. 1 being from Carrickfergus, and fig. 3 from Roundstone; both collected by the late Mr. M'Calla.

B. Fig. 1. CHYLOCLADIA KALIFORMIS, β patens:—*the natural size.* 2. Ramuli:—*magnified.* 3. Ch. kaliformis, γ squarrosa:—*the natural size.*

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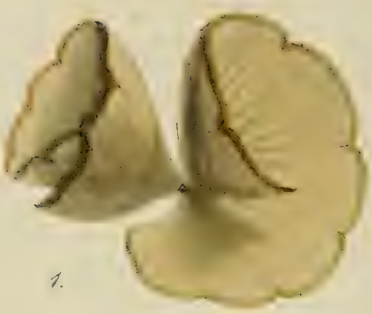
Plate CCCLIX.



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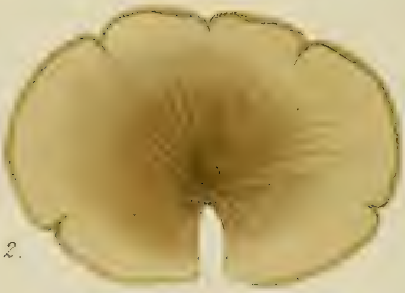

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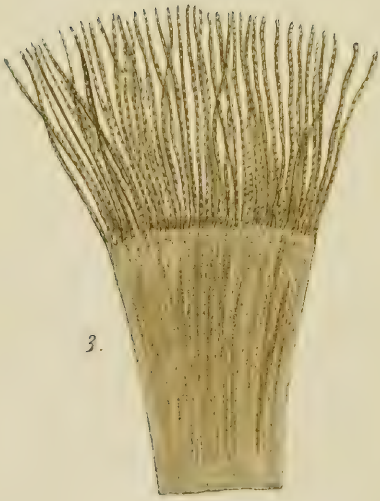

3.

4.

W.H.H. del et lith.

Reeve & Nichols

PLATE CCCLIX.

ZONARIA COLLARIS, *Ag.*

GEN. CHAR. *Root* coated with woolly fibres. *Frond* flat, ribless, fan-shaped, entire or variously cleft, marked with concentric lines; the cells of the surface radiating. *Margin* fringed. *Fructification,* roundish or irregular, scattered *sori,* bursting through the cuticle of both surfaces of the frond, consisting, at maturity, of numerous *spores* nestling among jointed threads. ZONARIA (*Ag.*),—from ζωνη, a *girdle* or *zone.*

ZONARIA *collaris*; "frond procumbent, coriaceous, orbicular, or cuneate and variously lobed, from its upper surface emitting cup-shaped, membranaceous fronds; the under surface rooting, densely stupose." *J. Ag.*

ZONARIA collaris, *Ag. Sp. Alg.* vol. i. p. 127. *Ag. Syst.* p. 264. *J. Ag. Alg. Medit.* p. 38. *Endl. 3rd Suppl.* p. 25. *Kütz. Sp. Alg.* 565.

PADINA collaris, *Grev. Syn.* part xliv. *Menegh. Ital.* p. 245. *Mont. Alger.* p. 33.

PADINA omphalodes, *Mont. Crypt. Alger.* p. 15. No. 168.

ZANARDINIA prototypus, *Nardo.* (*fide Meneg., &c.*)

HAB. (Washed ashore.) Granville Bay, Jersey (May 1851). *Miss Turner.* (Very rare.)

GEOGR. DISTR. Mediterranean and Adriatic Seas. West Indian Sea.

DESCR. "The primary frond, when mature, is coriaceous in colour and substance, widely spreading, furnished with a dense woolly coating on its lower surface, by which it strongly adheres to rocks; the upper surface is smooth, and variously plaited longitudinally; but by the action of the waves and of animalcules is mostly very much torn and lobed. From the upper surface of this primary frond rise cup-shaped secondary fronds, fixed by a very short stipes, in the dried plant resembling an umbilicus, and with the limb fringed with filaments. The youngest of these secondary fronds are smaller than peas; the full-grown about the height of the cup-shaped fronds of *Himanthalia*; all are delicately membranaceous, entire, and easily torn. The fringe of hairs that crowns the frond is formed of the free apices of the longitudinal strings of cells of the frond. Fruit unknown." *J. Ag.*

~~~~~

This most interesting addition to the Channel *Nereis*, was recently found on the shores of Jersey, by Miss Turner, to whom I am indebted for the specimens here figured, and which I rejoice to be able to include in the present work. They were "quite fresh," Miss Turner informs me, "when picked up;
~~~~~

lying among other Algæ on the sand in Granville Bay; they had a saucer-like shape, which they have lost in pressing." They consist merely of the secondary fronds, accidentally torn from the firmly attached primaries, which may possibly be reached by dredging on the coast. I have compared them with specimens of the Mediterranean plant received from J. Agardh, and the agreement is very perfect. There can, therefore, be no doubt of the indentity of the species.

Never having seen the primary frond, I give the specific character and description nearly in the words of Agardh; and our upper figure (fig. 1) is an attempted restoration of the flattened specimen, more faithfully represented at fig. 2.

Fig. 1. ZONARIA COLLARIS:—*the natural size.* 2. One of the fronds of the same opened out:—*the natural size.* 3. Apex of frond, with its fringe. 4. Filaments from the fringe:—*both magnified.*

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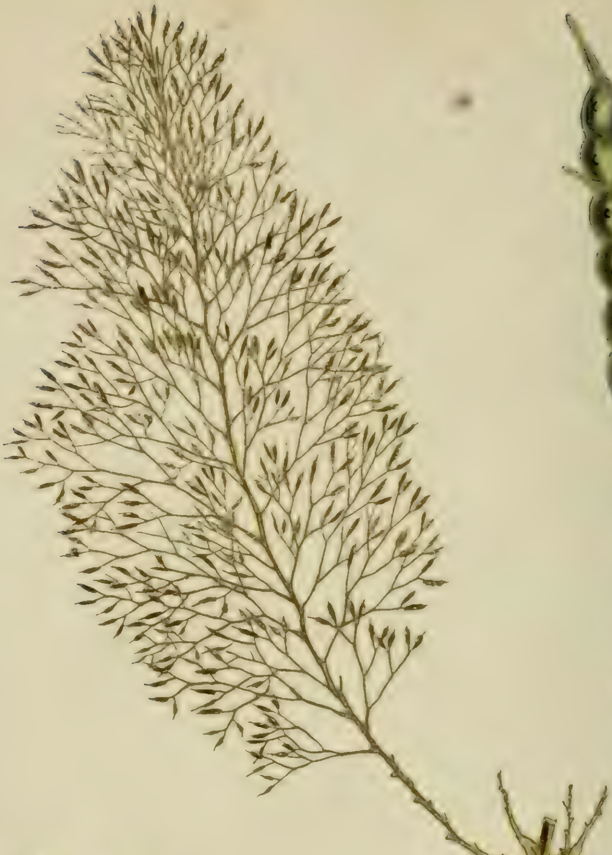

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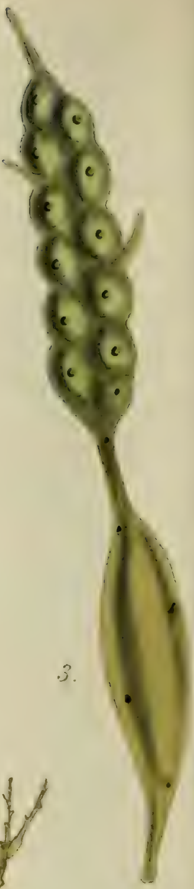

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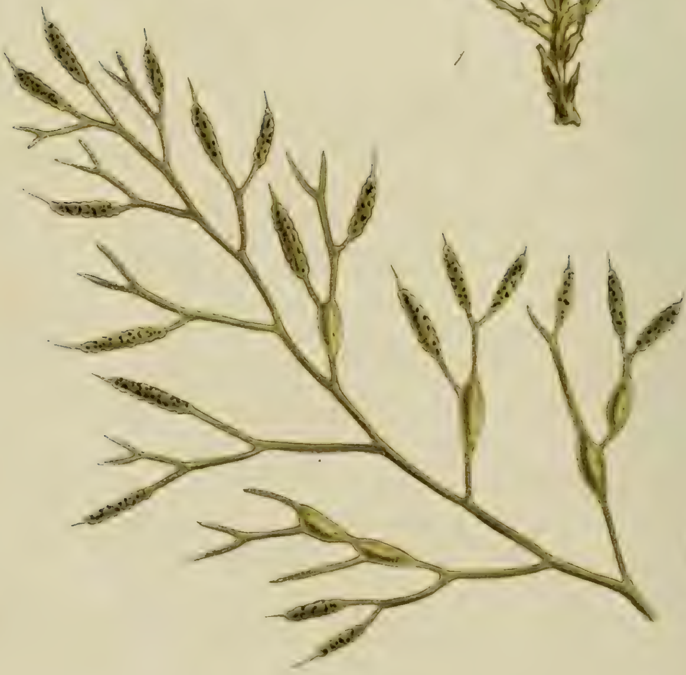

2.

PLATE CCCLX.

CYSTOSEIRA BARBATA, *Ag.*

GEN. CHAR. *Frond* much branched, occasionally leafy at the base; *branches* becoming more slender upwards, and containing strings of simple air-vessels within their substance. *Receptacles* terminal, small, cellular, pierced by numerous pores, which communicate with immersed, spherical *conceptacles*, containing parietal *spores*, and tufted *antheridia*. CYSTOSEIRA (*Ag.*),—from κυστις, a *bladder*, and σειρα, a *chain*; because the air-vessels are often arranged in strings.

CYSTOSEIRA *barbata*; stem cylindrical, covered with small, elliptical knobs, each of which bears a very slender, many times dichotomo-pinnated, filiform branch; air-vessels lanceolate, one or two together; receptacles small, elliptic-oblong, mucronate.

CYSTOSEIRA barbata, *Ag. Sp. Alg.* vol. i. p. 57; *Syst.* p. 283. *Grev. Alg. Brit.* p. 6. *Hook. Br. Fl.* vol. ii. p. 265. *Harv. Man.* ed. 1. p. 18; ed. 2. p. 17. *J. Ag. Sp. Alg.* vol. i. p. 223.

FUCUS barbatus, *Good. et Woodw. Linn. Trans.* vol. iii. p. 128. *Turn. Syn.* p. 80; *Hist.* t. 250. *Sm. E. Bot.* t. 2170. *Stack. Ner. Brit.* p. 83. t. 14.

FUCUS fœniculaceus, *Gm. Hist.* t. 2 A. f. 2 (!). *Huds. Fl. Ang.* p. 575.

HAB. Rocks between tide-marks. Said to have been gathered by Hudson in Devonshire; but has not been recently found.

GEOGR. DISTR. In the Mediterranean, Adriatic, and Black Seas. Brest, fide *Lenormand.*

DESCR. *Stem* about as thick as a swan's quill, simple or branched, truncate, densely clothed with lateral branches. *Branches* rising from slightly incrassated bases, filiform, very slender, unarmed, decompound, repeatedly pinnate, the lesser divisions dichotomous. *Vesicles*, when present, numerous, elongate, ellipsoidal or lanceolate, two or more together forming a chain in the branch. *Receptacles* terminating the dichotomous ramuli linear, of small size, 1–2 lines long, or rarely 3–4 lines, tuberculated, unarmed, or rarely with one or two spine-like processes, mucronate; the mucro subulate. *Colour* brownish-olive, becoming very dark in drying.

* * *

The figure here given has been prepared chiefly from a specimen collected at Catania in Sicily, and given me, many years ago, by Professor Gussone. I have seen no British specimen, nor am I aware that any authentic evidence is on record of the finding of this plant on the British coast, although it is mentioned as an undoubted native of Devonshire by Hudson, Stackhouse, and other early writers on these plants. Hudson says of it, "in Devonia *passim*," and Stackhouse gives "Devonshire and S.W. coast" as the station, but adds, "This species is rare, and has occasioned mistakes among our English botanists, who, after the example of Gmelin, have given it the trivial name of *F. fœniculaceus*, which appears, by the Linnæan herbarium, to be a very different species," &c. Both these authors quote Gmelin's figure, which, Turner observes, "is so characteristic" of his *F. barbatus* "as to take away all doubts as to the species." The last-named author, however, adds, "How far *F. barbatus* is really entitled to a place in the British Flora I own I entertain much doubt. I never saw a specimen gathered on our shores; and in Devonshire, where Hudson is stated to have gathered it, I have been fortunate enough to enjoy the advantage of correspondents, who would have been little likely to have left it unnoticed." This was written upwards of thirty years ago, since which time no part of England has been more zealously or more successfully explored (as these volumes bear ample evidence) than the coasts of Devonshire and Cornwall, but no one has met with a scrap of this plant; wherefore I fear it is but too evident that it has no claim to a place in this work.

Fig. 1. Cystoseira barbata; branch:—*the natural size.* 2. Dichotomous ramulus:—*magnified.* 3. A receptacle and air-vessel:—rather more *magnified.*

ALPHABETICAL INDEX

TO

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(*The synonymes are printed in Italics.*)

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